TRENDS IN INTERNATIONAL MATHEMATICS AND SCIENCE STUDY

TIMSS

TIMSS 2011 International Results in Mathematics

Ina V.S. Mullis, Michael O. Martin, Pierre Foy,
and Alka Arora



TIMSS & PIRLS
International Study Center
Lynch School of Education, Boston College

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Foreword

In both technologically advanced and developing economies, understanding educational outcomes is central to effective educational planning and reform. Further, in today's global innovation economy, competence in mathematics and science remains an educational imperative.

For more than 50 years, the International Association for the Evaluation of Educational Achievement (IEA) has been conducting comparative studies of educational achievement in a number of curriculum areas, including mathematics and science. TIMSS 2011 represents the fifth cycle of the Trends in International Mathematics and Science Study (TIMSS), developed by IEA. During the past two decades, TIMSS has reported on mathematics and science achievement trends at the fourth and eighth grades, providing educational policymakers, administrators, teachers, and researchers with powerful insights into how educational systems are functioning as well as critical intelligence about the possibilities for educational reform and improvement.

The *TIMSS 2011 International Results in Mathematics* presents extensive information on student performance in mathematics, including trends over the five assessments since 1995. Also included are data on performance in the mathematics content domains (algebra, geometry, etc.) and

on competence in managing the problem solving challenges in these mathematical contexts. In addition, the TIMSS 2011 report contains vital information on key curricular, instructional, and resource-related factors that can impact the teaching and learning process. These data on student achievement trends and the contexts for teaching and learning mathematics will ensure that TIMSS continues to set the standard for studies of this type and be regarded as a fundamental source of information for educational policymakers, planners, and researchers alike.

TIMSS requires and represents a significant commitment of resources and dedication to achieve a common vision. Clearly, projects of this magnitude rely on the cooperation and support of a large number of individuals, institutions, and organizations around the world. IEA is particularly indebted to the staff members of the TIMSS & PIRLS International Study Center at Boston College, who have been charged with the overall leadership of this project. Their contributions have been augmented by the staff of the IEA Data Processing and Research Center, the IEA Secretariat, Statistics Canada, and Educational Testing Service, for whose support I am also extremely grateful. While the work of the staff of this consortium makes projects like TIMSS possible, the continued leadership and direction of the TIMSS Executive Directors Ina Mullis and Michael Martin remain central to the success of this project.

In addition, projects of this size are possible only with considerable financial support. I am particularly grateful for support from IEA's major funding partners, including the US National Center for Education Statistics, the World Bank, and the many self-funding countries without which this project would not have been possible. I also wish to thank Boston College for its continued support of the TIMSS & PIRLS International Study Center.

Finally, as always, TIMSS would not have been possible without the National Research Coordinators and their colleagues, whose responsibility it was to manage the study at the local level, and the participation of the many teachers, students, and policymakers around the world who gave freely of their time in the interest of advancing our common understanding of reading achievement. On behalf of all who benefit from the use of the information provided by TIMSS, we are thankful for this commitment.

Hans Wagemaker
Executive Director, IEA

Executive Summary

TIMSS is an international assessment of mathematics and science at the fourth and eighth grades that has been conducted every four years since 1995. In 2011, nationally representative samples of students in 63 countries and 14 benchmarking entities (regional jurisdictions of countries, such as states) participated in TIMSS. Countries and benchmarking participants could elect to participate in the fourth grade assessment, the eighth grade assessment, or both: fifty-two countries and seven benchmarking entities participated in the fourth grade assessment, and 45 countries and 14 benchmarking entities participated in the eighth grade assessment. Several of the countries, where fourth and eighth grade students were expected to find the TIMSS assessments too difficult, administered the fourth and eighth grade assessments to their sixth and ninth grade students.

In total, more than 600,000 students participated in TIMSS 2011. TIMSS 2011 continues the series of international assessments in mathematics and science conducted by the International Association for the Evaluation of Educational Achievement (IEA).

IEA pioneered international comparative assessments of educational achievement in the 1960s to gain a deeper understanding of the effects of policies and practices across countries' different systems of education. TIMSS is directed by IEA's TIMSS & PIRLS International Study Center at Boston College.

This TIMSS 2011 report summarizes the mathematics achievement results of fourth and eighth grade students in countries around the world, and provides trends over the five assessments since 1995. As a complement to this volume, *TIMSS 2011 International Results in Science* summarizes fourth and eighth grade students' science achievement in each of the 63 countries and 14 benchmarking participants.

The TIMSS mathematics assessment is based on a comprehensive framework developed collaboratively with the participating countries that is organized around two dimensions:

- A content dimension specifying the domains or subject matter to be assessed within mathematics; and
- A cognitive dimension specifying the domains or thinking processes expected of students as they engage with the mathematics content.

The content domains and topic areas within them are different for the fourth and eighth grades, but the cognitive domains are the same for both grades, encompassing a range of cognitive processes involved in solving problems throughout the primary and middle school years.

Fourth Grade Content Domains	Eighth Grade Content Domains
50% Number	30% Number
35% Geometric Shapes and Measures	30% Algebra
15% Data Display	20% Geometry
	20% Data and Chance

Fourth Grade Cognitive Domains	Eighth Grade Cognitive Domains
40% Knowing	35% Knowing
40% Applying	40% Applying
20% Reasoning	25% Reasoning

Given the frameworks' broad coverage goals, the mathematics assessment item pools were necessarily large—175 and 217 assessment items at the fourth and eighth grades, respectively—with about half being multiple choice and half being constructed response items where students write their answers. The achievement results are reported on the TIMSS achievement scales for the fourth and eighth grades, each with a range of 0–1,000 (although student performance typically ranges between 300 and 700). TIMSS uses the centerpoint of the scale (500) as a point of reference that remains constant from assessment to assessment.

East Asian Countries Are Top-performers in TIMSS 2011

East Asian countries continue to lead the world in mathematics achievement. Singapore, Korea, and Hong Kong SAR, followed by Chinese Taipei and Japan, were the top-performing countries at the fourth grade. Similarly, at the eighth grade, Korea, Singapore, and Chinese Taipei outperformed all other countries, followed by Hong Kong SAR and Japan.

Top-performing Countries in TIMSS 2011

Fourth Grade	Eighth Grade
Singapore	Korea
Korea	Singapore
Hong Kong SAR	Chinese Taipei
Chinese Taipei	Hong Kong SAR
Japan	Japan

In addition to the five top-performers at the fourth grade, Northern Ireland, Belgium (Flemish), Finland, England, and the Russian Federation rounded out the top ten high-achieving countries. The US states of Florida and North Carolina had performance similar to these countries. At the eighth grade, the Russian Federation, Israel, Finland, the United States, and England also were included in the top ten high-achieving countries. The US states of Massachusetts, Minnesota, and North Carolina and the Canadian province of Québec also had high achievement, but lower than the East Asian countries.

While there were small differences from country to country, there was a substantial range in performance from the top-performing to the lower-performing countries. Twenty-two countries at the fourth grade and the three assessing their sixth grade students had average achievement below the TIMSS scale centerpoint of 500, as did two benchmarking participants. At the eighth grade, 27 countries and the three assessing their ninth grade students had average achievement below 500, as did three benchmarking participants.

Fourth Grade Shows More Increases Than Decreases, but Not Eighth Grade

At the fourth grade, 17 countries and three benchmarking participants have comparable data from 1995 and 2011, providing trends over the past 16 years. Since 1995, twelve of these countries raised their levels of mathematics achievement and only three had decreases. Among the benchmarking participants, the Canadian province of Ontario increased achievement and

Trends Between 1995 and 2011, Fourth Grade

Countries Improving	Countries Declining
Australia	Austria
England	Czech Republic
Hong Kong SAR	Netherlands
Iran	
Japan	
Korea	
New Zealand	
Norway	
Portugal	
Singapore	
Slovenia	
United States	

Trends Between 1995 or 1999* and 2011, Eighth Grade

Countries Improving	Countries Declining
Chile	Finland (Seventh Grade)
Chinese Taipei	Hungary
Hong Kong SAR	Japan
Italy	Jordan
Korea	Macedonia
Lithuania	Malaysia
Russian Federation	Norway
Slovenia	Romania
United States	Sweden
	Thailand
	Tunisia

*The 1999 assessment only was given at the eighth grade, and a number of countries joined at that time.

the province of Québec decreased achievement between 1995 and 2011.

At the eighth grade, there was more balance between mathematics achievement growth and decline among countries. Of the 25 countries and eight benchmarking participants with comparable data spanning 1995 or 1999 to 2011, nine countries had increased achievement and eleven countries had decreased achievement. In addition, four benchmarking participants had increased achievement—the Canadian province of Ontario and the US states of Massachusetts, Minnesota, and North Carolina—while two had decreased achievement—the Canadian provinces of Alberta and Québec.

Overview of TIMSS 2011 International Benchmarks, Fourth Grade

Advanced
• *Apply understanding in relatively complex situations and explain reasoning.*
High
• *Apply knowledge and understanding to solve problems.*
Intermediate
• *Apply basic knowledge in straightforward situations.*
Low
• *Have some basic mathematical knowledge.*

Overview of TIMSS 2011 International Benchmarks, Eighth Grade

Advanced
• *Reason, draw conclusions, make generalizations, and solve linear equations*
High
• *Apply knowledge and understanding in a variety of relatively complex situations.*
Intermediate
• *Apply basic knowledge in a variety of situations.*
Low
• *Some knowledge of whole numbers and decimals, operations, and basic graphs.*

This report contains a number of items illustrating performance at the TIMSS International Benchmarks at the fourth and eighth grades.

Trends at TIMSS International Benchmarks

TIMSS reports achievement at four points along the scale as international benchmarks: Advanced International Benchmark (625), High International Benchmark (550), Intermediate International Benchmark (475), and Low International Benchmark (400).

At the fourth grade, reflecting the upward trends in average achievement, there were more improvements across the International Benchmarks in 2011 than there were declines. Remarkably, only one country showed decreases in achievement at all four benchmarks between 1995 and 2011, and nine countries showed improvement at all four benchmarks, raising the level of performance across the entire distribution of student achievement.

Reflecting less improvement across countries at the eighth grade, three countries declined since 1995 at all four benchmarks (Hungary, Sweden, and Norway), and only three countries improved at all four benchmarks.

Countries with Increases at All Four TIMSS International Benchmarks between 1995 and 2011, Fourth Grade

Korea	Australia
Hong Kong SAR	Portugal
Japan	Slovenia
England	Iran
United States	

Countries with Increases at All Four TIMSS International Benchmarks between 1995 and 2011, Eighth Grade

Korea
United States
Lithuania

Very High Percentages of East Asian Students Reach TIMSS International Benchmarks

At both the fourth and eighth grades, the five East Asian countries had the largest percentages of students reaching the TIMSS International Benchmarks, and the gaps were especially large at the highest levels.

At the fourth grade, Singapore had 43 percent of their students reach the TIMSS Advanced International Benchmark, followed by Korea, Hong Kong SAR, Chinese Taipei, and Japan, all with 30 percent or more. Northern Ireland was next with 24 percent, then England with 18 percent. These five Asian countries also had from 70 to 80 percent reach the High Intermediate Benchmark (again, Northern Ireland was next, but with 59%), and 93 percent or more reach the Intermediate International Benchmark (Belgium, Flemish had 89% and the Netherlands 88%). Although Belgium (Flemish) and the Netherlands had fewer students reaching the highest benchmarks than did the top-performing Asian countries, they had nearly as many reaching the Intermediate level and just as many reaching the Low level.

Percentages of East Asian Students Reaching International Benchmarks in TIMSS 2011, Fourth Grade

Advanced 30% or More	High 70% or More	Intermediate 93% or More	Low 99% or More
43% Singapore	80% Korea	97% Korea	100% Korea
39% Korea	80% Hong Kong SAR	96% Hong Kong SAR	99% Singapore
37% Hong Kong SAR	78% Singapore	94% Singapore	99% Hong Kong SAR
34% Chinese Taipei	74% Chinese Taipei	93% Chinese Taipei	99% Chinese Taipei
30% Japan	70% Japan	93% Japan	99% Japan
			99% Belgium (Flemish)
			99% Netherlands
Next Highest Percentage			
24% Northern Ireland	59% Northern Ireland	89% Belgium (Flemish)	98% Finland

At the eighth grade, clearly the East Asian countries, particularly Chinese Taipei, Singapore, and Korea, are pulling away from the rest of the world by a considerable margin. Capitalizing on the head start demonstrated by their fourth grade students, these same five East Asian countries had by far the largest percentages of eighth grade students reaching the Advanced International Benchmark. Very impressively, Chinese Taipei, Singapore, and Korea had nearly half of their students (47–49%) reach the Advanced International Benchmark. Hong Kong SAR had about one-third (34%) reach this level, and Japan had over one-fourth (27%). Next, the Russian Federation and Israel had 14 and 12 percent, respectively. At the High International Benchmark, Japan (61%) trailed the other four Asian high achievers (71–78%), but the next highest were the Russian Federation and Israel with less than half (40–47%) achieving at the high level. At the Intermediate International Benchmark, the Russian Federation (78%) followed the five top-performers (87–93%), and at the Low International Benchmark Finland and the Russian Federation joined the five East Asian countries (with 95–99%), followed by Slovenia (93%).

Percentages of East Asian Students Reaching International Benchmarks in TIMSS 2011, Eighth Grade

Advanced 27% or More	High 61% or More	Intermediate 87% or More	Low 95% – 99%
49% Chinese Taipei	78% Singapore	93% Korea	99% Singapore
48% Singapore	77% Korea	92% Singapore	99% Korea
47% Korea	73% Chinese Taipei	89% Hong Kong SAR	97% Hong Kong SAR
34% Hong Kong SAR	71% Hong Kong SAR	88% Chinese Taipei	97% Japan
27% Japan	61% Japan	87% Japan	96% Chinese Taipei
			96% Finland
			95% Russian Federation
Next Highest Percentage			
14% Russian Federation	47% Russian Federation	78% Russian Federation	93% Slovenia

More Countries Demonstrate Relative Strength in Knowing Mathematics than Applying and Reasoning

Generally, the TIMSS 2011 participants with the highest achievement overall also had the highest achievement across the content and cognitive demands. However, many countries performed relatively higher in one or two of the content domains compared, to their overall performance, and relatively lower in one or two others.

Internationally, the fewest countries showed relative strength in geometry. For example, at the eighth grade, many countries (25) had relatively higher achievement in algebra than they did overall, and far fewer (only 10) had relatively higher achievement in geometry.

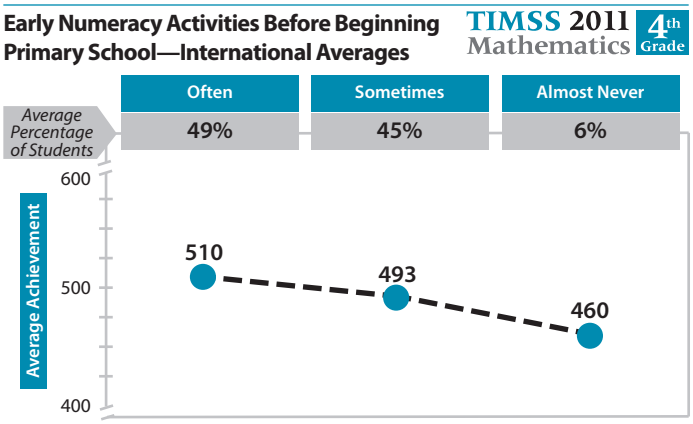
Across the fourth and eighth grades, more countries demonstrated relative strengths in knowing mathematics (i.e., recalling, recognizing, and computing) than in applying mathematical knowledge and reasoning.

Early Start Crucial in Developing Children's Mathematics Achievement

An early start is crucial in shaping children's numeracy skills. In TIMSS 2011, at the fourth and sixth grades, and for the benchmarking participants, students had higher mathematics achievement if their parents reported that:

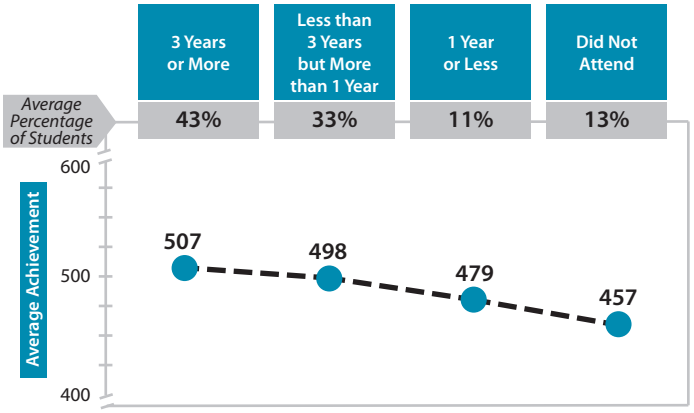
- They often engaged in early numeracy activities with their children;
- Their children had attended preprimary education; and
- Their children started school able to do early numeracy tasks (e.g., simple addition and subtraction).

There is increasing evidence that participating in numeracy activities as well as literacy activities during the preschool years can have beneficial effects on children's later acquisition of numeracy skills. To examine students' early home experiences, TIMSS includes an Early Numeracy Activities scale based on parents' reports about the frequency of having done six activities with their child, such as playing with number toys, counting things, and playing number or card games. Internationally, the 49 percent of students whose parents **Often** engaged them had higher average achievement than the students whose parents only **Sometimes** (60%) engaged them, and the small percentage of students whose parents **Almost Never** did any of the activities with them had the lowest average mathematics achievement.



Students Attended Preprimary Education—International Averages

TIMSS 2011 Mathematics 4th Grade



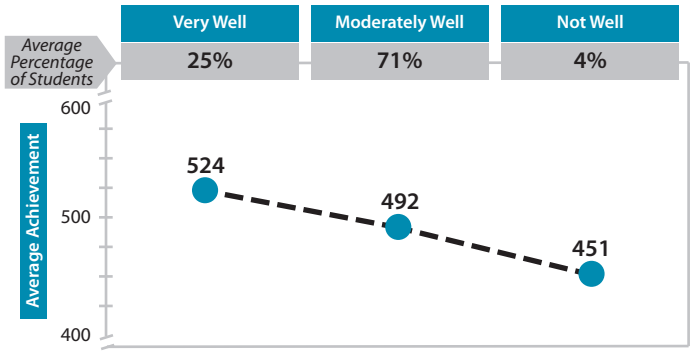
Preprimary education, in the form of preschool, kindergarten, or an early childhood education program, plays an important role in preparing children for primary school. Besides giving students an early start in school and life, preprimary education provides an avenue for overcoming children's disadvantages and can help to break the generational cycles of poverty and low achievement. According to the *TIMSS 2011 Encyclopedia*, some countries already have mandatory preprimary education and some have nearly 100 percent enrollment, even though attendance is not mandatory. Of course, school policies of entering primary school at older ages permit opportunities for more years of preschool attendance than when children start primary school at younger ages.

Although attendance in preprimary education differed dramatically from country to country, on average, the fourth grade students with at least three years of preprimary education (43%), or even more than one year (33%), had higher average achievement than their counterparts with only one year or less of preprimary education. Most notably, the 13 percent of students, on average, that did not attend preschool had much lower average mathematics achievement.

Considering that 1) parents are children's first teachers and many parents have concentrated on numeracy skills, and that 2) substantial percentages of children in some countries have attended several years of preprimary education, it is not surprising that many children begin primary school with some numeracy skills. TIMSS included the Early Numeracy Tasks scale based on parents' assessments of how well their children could do six early numeracy tasks (e.g., simple addition and subtraction) upon entering school. Parents' assessments of their children's initial numeracy skills corresponded well

Students Could Do Early Numeracy Tasks When Began Primary School—International Averages

TIMSS 2011 Mathematics 4th Grade

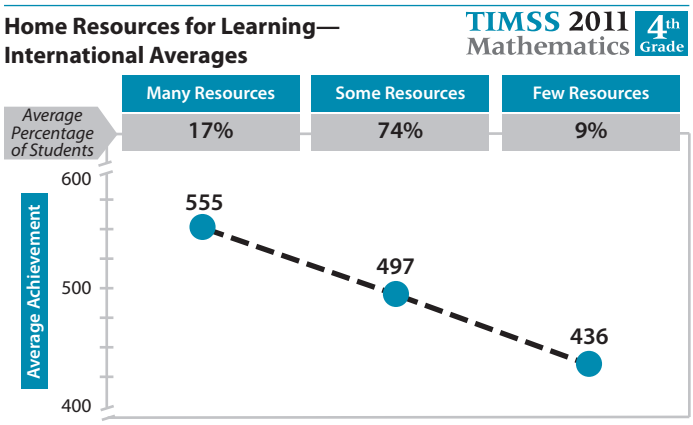


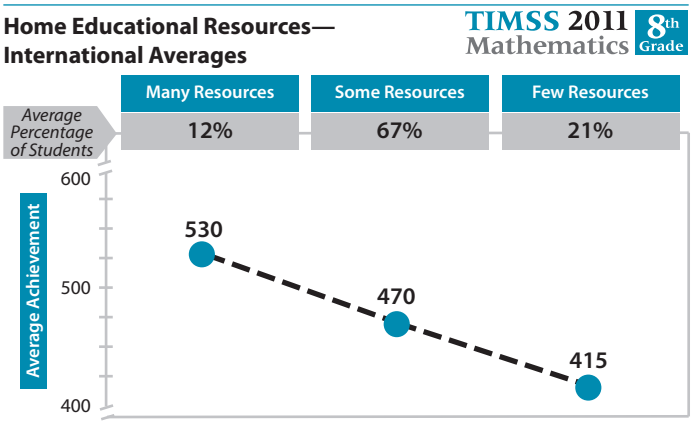
with mathematics achievement at the fourth and sixth grades, and among benchmarking participants. For example, mathematics achievement at the fourth grade was substantially higher for the one-quarter of students whose parents reported their children could perform the activities **Very Well**, next highest for the 71 percent whose parents reported **Moderately Well**, and much lower for the few whose parents reported **Not Well**.

Home Resources Strongly Related to Mathematics Achievement

Research consistently shows a strong positive relationship between achievement and indicators of socioeconomic status, such as parents' or caregivers' level of education. At the fourth and sixth grades, TIMSS used the parents' reports on the availability of key home resources to create the Home Resources for Learning scale, including parents' education, parents' occupation, books in the home, and study supports. Internationally, on average, the 17 percent of students with **Many Resources** had substantially higher mathematics achievement than the nine percent with **Few Resources**—a 119-point difference. However, almost three-quarters of the fourth grade students (74%) had **Some Resources**.

At the eighth and ninth grades, TIMSS asked the students themselves about their parents' education, books in the home, and study supports, with similar results. Internationally, the twelve percent of eighth grade students with **Many Resources** had the highest average achievement, the two-thirds with **Some Resources** had the next highest achievement, and the one-fifth with **Few Resources** had the lowest average achievement.





Successful Schools Tend to Be Well-resourced

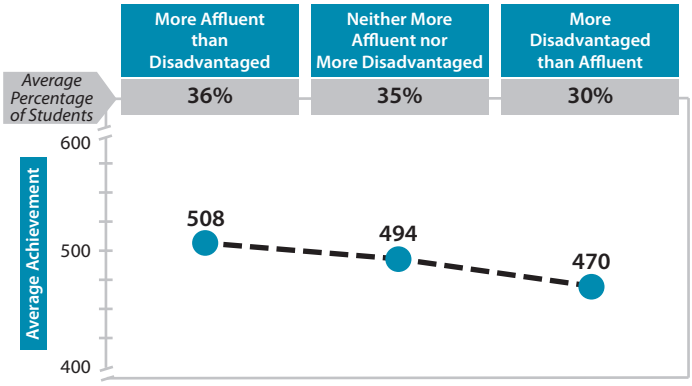
Ever since the Coleman report in 1966, researchers have recognized that the compositional characteristics of a school's student body can affect student achievement. To provide information on this topic, TIMSS routinely asks school principals to report on their students' economic home backgrounds and home language. While there was variation across countries, higher average mathematics achievement was associated with students attending schools where a greater percentage of students had the following characteristics:

- Were from relatively affluent socioeconomic backgrounds; and
- Spoke the language of the TIMSS assessment as their first language.

For example, students were distributed relatively equally across three types of schools categorized by the affluence of their home backgrounds. At the fourth grade, 36 percent attended schools with relatively more students from affluent than from economically disadvantaged homes, and these students had the highest average achievement. At the other end of the range, 30 percent of students attended schools with relatively more students from economically disadvantaged homes, and these students had the lowest average achievement.

School Composition by Student Home Economic Background—International Averages

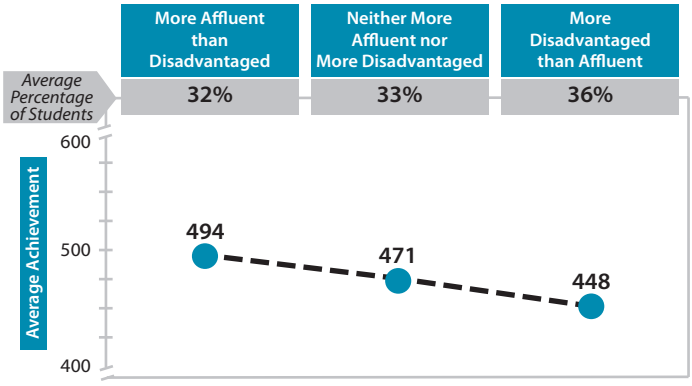
TIMSS 2011 Mathematics 4th Grade



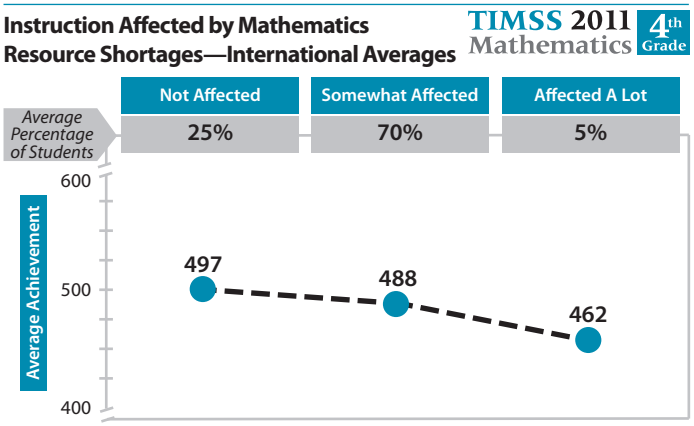
Similarly, at the eighth grade, 32 percent attended schools with relatively more students from affluent than disadvantaged homes, and these students had the highest average achievement. Conversely, 36 percent of students attended schools with relatively more students from economically disadvantaged homes, and these students had the lowest average achievement.

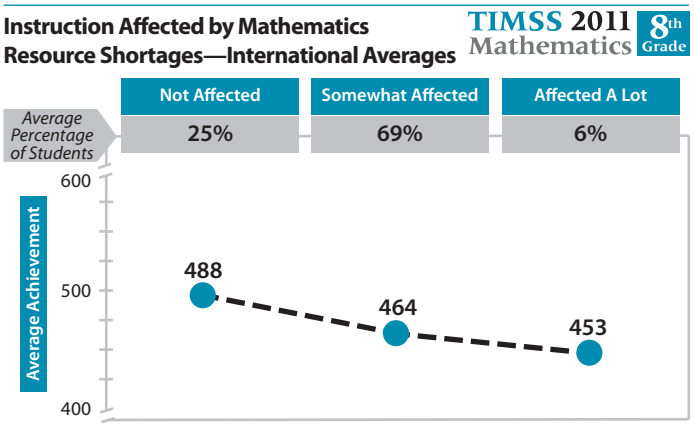
School Composition by Student Home Economic Background—International Averages

TIMSS 2011 Mathematics 8th Grade



Successful schools also are likely to have better working conditions and facilities as well as more instructional materials, such as books, computers, technological support, and supplies. TIMSS 2011 created the Mathematics Resource Shortages scale based on principals' responses concerning inadequacies in general school resources (materials, supplies, heating/cooling/lighting, buildings, space, and staff) as well as resources specifically targeted to support mathematics instruction (specialized teachers, computers, computer software, calculators, library materials, and audio-visual resources). Many countries were fortunate to have very few, if any, students in schools where instruction was **Affected A Lot** by resource shortages. However, this was a crucial problem in some countries. At both the fourth and eighth grades, the one-quarter of students in schools **Not Affected** by resource shortages had higher average mathematics achievement than their counterparts in less well-resourced schools. For students at the sixth and ninth grades, there was more impact from lack of resources, with greater percentages of students in schools **Affected A Lot** by resource shortages.



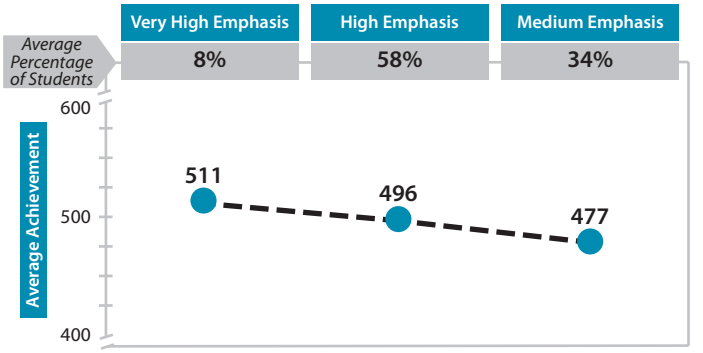


Successful Schools Emphasize Academic Success and Have Safe and Orderly Environments

Students with the highest mathematics achievement typically attend schools that emphasize academic success, as indicated by rigorous curricular goals, effective teachers, students that desire to do well, and parental support. Both principals and teachers answered the questions comprising the School Emphasis on Academic Success scale, and both were extremely positive and remarkably similar in their responses. At both the fourth and eighth grades, there was a direct correspondence between average mathematics achievement and principals' reports, with higher emphasis on academic success related to higher average mathematics achievement.

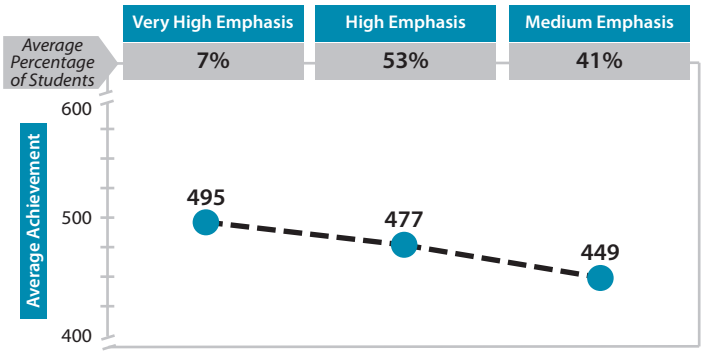
Principals' School Emphasis on Academic Success— International Averages

TIMSS 2011 Mathematics 4th Grade



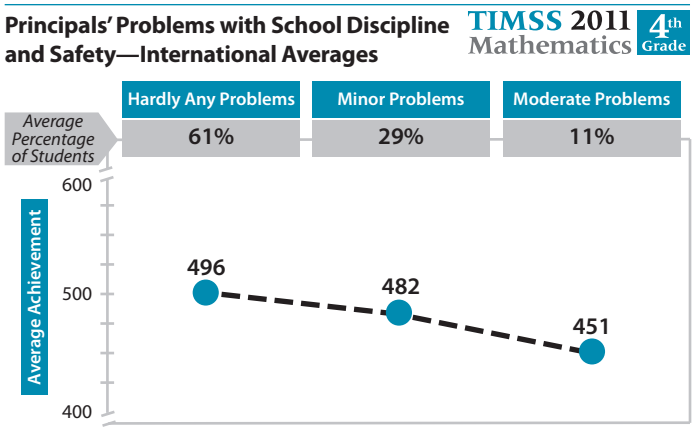
Principals' School Emphasis on Academic Success—International Averages

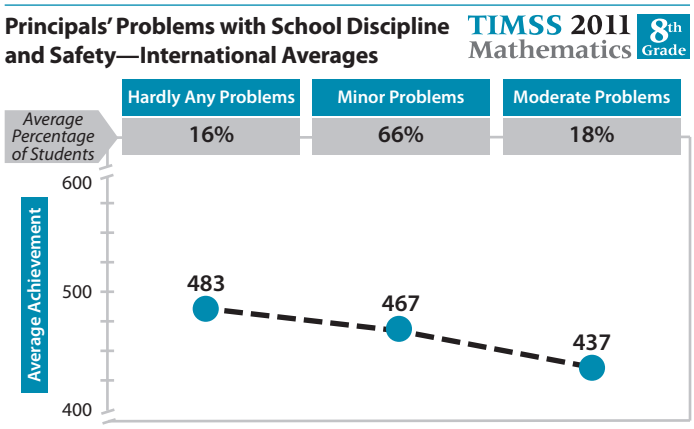
TIMSS 2011 Mathematics 8th Grade



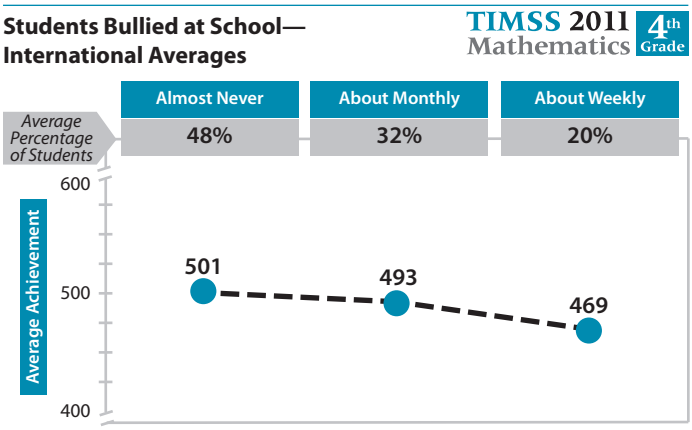
In contrast, schools with discipline and safety problems are not conducive to high achievement. The sense of security that comes from attending a school with few behavior problems and having little or no concern about student or teacher safety promotes a stable learning environment. To create the School Discipline and Safety scale, principals provided their perceptions about the degree to which a series of ten discipline, disorderly, and bullying behaviors were problems in their schools.

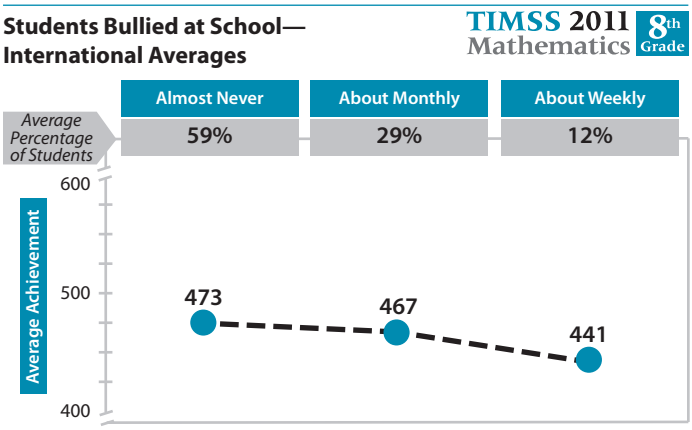
At both the fourth and eighth grades, students who attended schools with disorderly environments and who reported more frequent bullying had much lower achievement than their counterparts in safe and orderly schools. Interestingly, across the fourth grade countries, 61 percent of students, on average, attended schools with **Hardly Any Problems** with discipline or safety, 29 percent were in schools with **Minor Problems**, and 11 percent attended schools with **Moderate Problems**. Across the eighth grade countries, however, discipline appeared to be more of an issue; principals reported that only 16 percent of students were in schools with **Hardly Any Problems**, 66 percent were in schools with **Minor Problems,** and 18 percent attended schools with **Moderate Problems**.





There is growing evidence that bullying in schools is on the rise, especially with the emergence of cyber-bullying, and that bullying does have a negative impact on students' educational achievement. The Students Bullied at School scale was based on how often students experienced six bullying behaviors, such as "Someone spread lies about me" and "I was made to do things I didn't want to do by other students."





At both the fourth and eighth grades, an increase in the frequency of bullying was related to a decrease in average mathematics achievement. Unsettlingly, across countries, although nearly half of the fourth grade students reported **Almost Never** being bullied (48%), the majority were bullied either **About Monthly** (32%) or **About Weekly** (20%).

In contrast to principals' reports of more school discipline and safety problems at the eighth grade than fourth grade, the eighth grade students reported experiencing somewhat less bullying behavior than the fourth grade students.

Teacher Preparation and Career Satisfaction Related to Higher Mathematics Achievement

In view of the importance of a well-prepared teaching force to an effective education, TIMSS 2011 collected a variety of information about teacher education. Internationally, most students were taught by the following:

- Teachers with bachelor's or postgraduate university degrees (79% at the fourth grade, and 87% at the eighth grade);
- Teachers with at least 10 years of experience (71% at the fourth grade, and 64% at the eighth grade);
- Teachers who reported being **Very Well** prepared to teach the TIMSS mathematics topics (83% at the fourth grade, and 84% at the eighth grade); and
- Teachers **Very Confident** in teaching mathematics (75% at the fourth grade, 76% at the eighth grade).

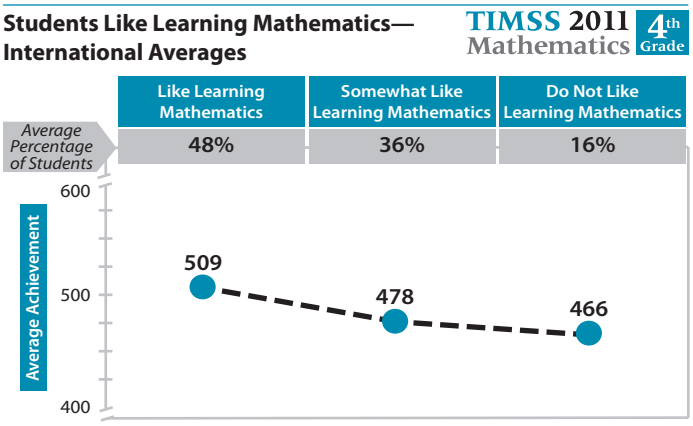
At both the fourth and eighth grades, students with more experienced and more confident teachers had higher mathematics achievement.

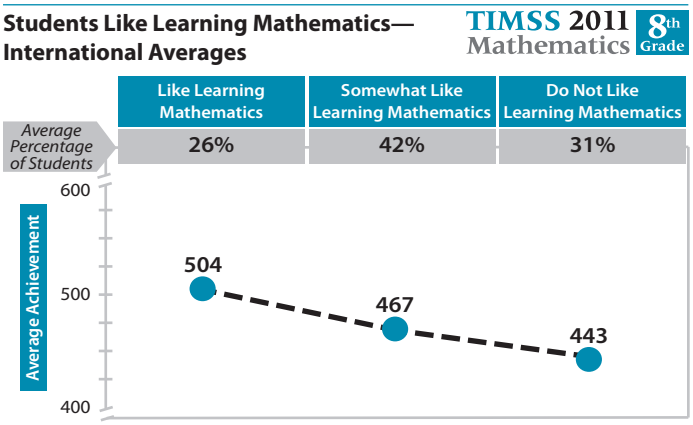
The TIMSS 2011 Teacher Career Satisfaction scale categorized students based on their teachers' degree of agreement with six statements, such as "I do important work as a teacher" and "I plan to continue as a teacher for as long as I can." At both the fourth and eighth grades, teacher satisfaction was positively related to average mathematics achievement, and very few students had teachers that expressed any dissatisfaction except in a small number of countries.

Internationally, the fourth grade students with **Satisfied** mathematics teachers (54%) had higher achievement than those with teachers that were only **Somewhat Satisfied** (41%) or **Less Than Satisfied** (5%). The eighth grade mathematics teachers reported somewhat lower levels of career satisfaction, with the 47 percent of students taught by **Satisfied** mathematics teachers having higher mathematics achievement than those taught by only **Somewhat Satisfied** (45%) or **Less Than Satisfied** (7%) teachers.

Students with Positive Attitudes Toward Mathematics Have Higher Achievement, but Attitudes Less Positive at the Eighth Grade

Each successive TIMSS assessment has shown a strong positive relationship within countries between student attitudes toward mathematics and their mathematics achievement. The relationship is bidirectional, with attitudes and achievement mutually influencing each other.

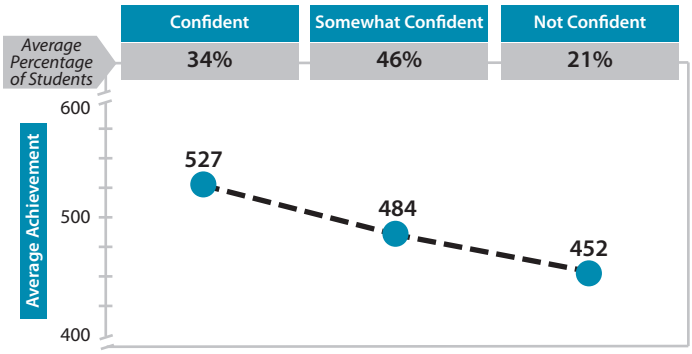




The Students Like Learning Mathematics scale was based on students' degree of agreement with six statements, such as "I enjoy learning mathematics" and "I learn many interesting things in mathematics." Internationally, nearly half of the fourth grade students **Like Learning Mathematics,** and they had higher average achievement than those that **Somewhat Like Learning Mathematics** (36%). Those that **Do Not Like Learning Mathematics** (16%) had the lowest average achievement.

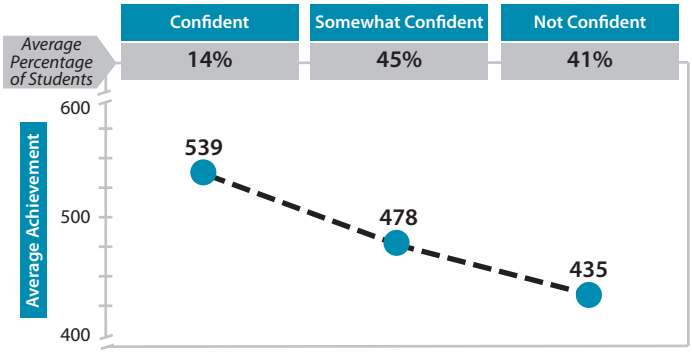
Students Confident in Mathematics—International Averages

TIMSS 2011 Mathematics 4th Grade



Students Confident in Mathematics—International Averages

TIMSS 2011 Mathematics 8th Grade



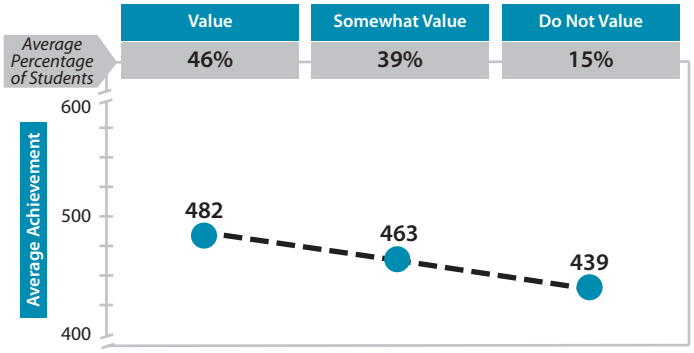
Substantially fewer eighth grade students reported positive attitudes toward learning mathematics. The eighth grade students with more positive attitudes had higher mathematics achievement, but only one-fourth were in the **Like Learning Mathematics** category and nearly one-third were in the category **Do Not Like Learning Mathematics.**

The Students Confident in Mathematics scale includes seven statements, such as "Mathematics is harder for me than for many of my classmates" (reverse coded) and "My teachers tells me I am good at mathematics." Internationally, just one-third of the fourth grade students expressed confidence in their mathematics ability, but their mathematics achievement was higher than for the **Somewhat Confident** students. The students lacking confidence (21%) had the lowest achievement.

Disturbingly, only 14 percent of the eighth grade students, on average, expressed confidence in their mathematics ability, with most students divided between **Somewhat Confident** (45%) and **Not Confident** (41%). The achievement gap was more than 100 points between the small percentage of **Confident** students and the two-fifths **Not Confident**.

Students Value Mathematics—International Averages

TIMSS 2011 Mathematics 8th Grade



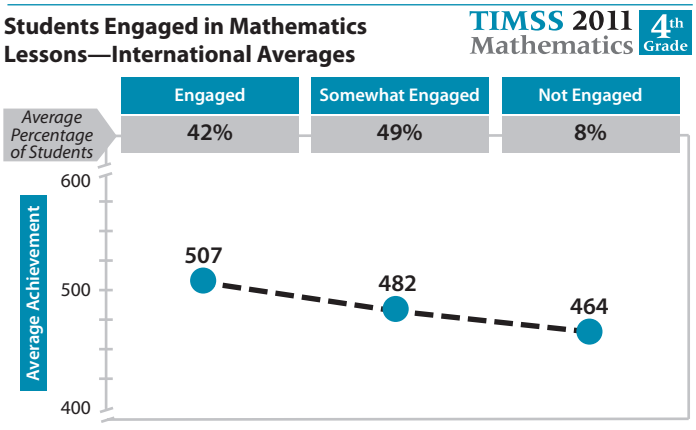
The Students Value Mathematics scale asked the eighth grade students about six different aspects of valuing mathematics, including "I think learning mathematics will help me in my daily life" and "I need to do well in mathematics to get the job I want." Apparently, even though many of

the eighth grade students do not especially enjoy learning mathematics, they do appreciate the value of the subject. Internationally, the nearly one-half of students that **Value** mathematics had the highest average achievement, followed by those that **Somewhat Value** the subject. Those that **Do Not Value** mathematics (15%) had the lowest average achievement.

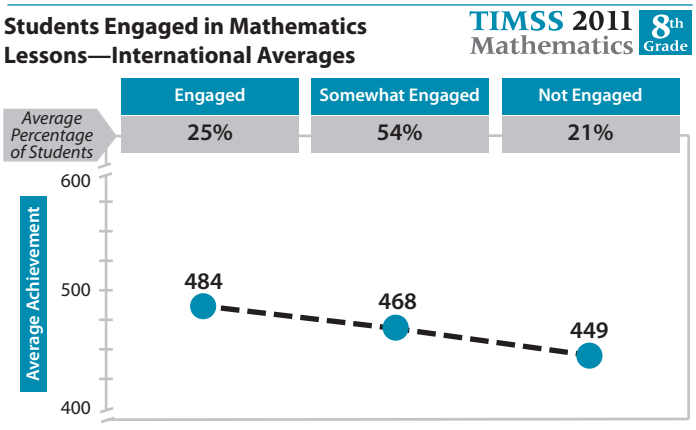
Engaging Instruction Related to Higher Mathematics Achievement

To help build a better bridge between curriculum and instruction, TIMSS 2011 collected information about the concept of student engagement in learning, which focuses on the cognitive interaction between the student and the instructional content. To measure aspects of student engagement, TIMSS 2011 developed both a a student scale called the Engaged in Mathematics Lessons scale, and a teacher scale, called the Engaging Students in Learning scale.

From the students' perspective, the Engaged in Mathematics Lessons scale asked how much students agreed with five statements, such as "I know what my teacher expects me to do" and "I am interested in what my teacher says." Internationally, the fourth grade students **Engaged** in their mathematics lessons had the highest achievement, followed by those **Somewhat Engaged** (42%) and the few students **Not Engaged** (8%).



At the eighth grade, internationally, smaller percentages of students reported being **Engaged**, although this 25 percent had the highest mathematics achievement. The majority reported being only **Somewhat Engaged**, and the one-fifth of students **Not Engaged** had the lowest average achievement.



Also, students were categorized according to how often their teachers reported using six instructional practices (four at the eighth grade) intended to interest students and reinforce learning

(e.g., summarizing the lesson's learning goals, questioning to elicit reasons and explanations, and bringing interesting things to class). Many fourth grade students internationally (69%) had mathematics teachers that made efforts to use these practices to engage them in **Most Lessons**, and the rest had teachers that used such practices in **About Half the Lessons** (with a few exceptions). Internationally, at the eighth grade, relatively small percentages of students had teachers that frequently related lessons to students' daily lives (39%), and even smaller percentages had teachers that routinely brought interesting materials to class (18%).

Instruction Affected by Students Lacking in Basic Nutrition and Sleep

Finally, the characteristics of the students themselves can be very important to the classroom atmosphere. Unfortunately, some children in many countries around the world suffer from hunger, and a growing body of research, mostly in developing countries, is providing evidence that malnutrition has a negative impact on educational achievement. Similarly, a number of studies in a variety of countries have shown sleep duration and quality to be related to academic functioning at school.

On average, internationally, most fourth grade (71%) and eighth grade students (63%) were in classrooms where instruction was "not at all" limited because students were lacking in basic nutrition. These students had higher average mathematics achievement than their peers in classrooms where instruction was limited "some or a lot" because students suffered from lack of basic nutrition. The percentage lacking in basic nutrition was much higher in some countries, including some of those that participated at the sixth and ninth grades.

Internationally, students suffering from some amount of sleep deprivation did have lower average mathematics achievement. Teachers reported that only a scant majority of fourth grade students (53%) and not even half of the eighth grade students (43%), across countries, were in classrooms where instruction was "not at all" limited by students suffering from not enough sleep. Further, while there was considerable variation across countries, in a number of TIMSS 2011 countries and benchmarking participants at least two-thirds of students reportedly were at least somewhat sleep deprived.

Introduction

Students need to develop mathematical understanding to manage successfully in school and society. Mathematics is the foundation for further study in a number of school subjects, most notably the sciences; and mathematics problem solving builds logical reasoning skills that can be applied in many situations. For students' everyday life, today and in the future, mathematics is pervasive, from managing money to cooking and a range of other tasks. For example, mathematics is used to determine lengths of time, put things together (from models to electronics), and calculate quantities of what to buy (from pizza to paint).

The world is becoming increasingly "quantified," and all students need to be well grounded in mathematical and technological thinking to live a productive life. To be effective future citizens, students need mathematics to understand daily news and grasp world events, often described through statistics, increases, and decreases. Considering students' future careers, mathematics is important to some degree in most occupations (e.g., construction, manufacturing, and business) and is required at a high level in many higher paying fields (e.g., engineers, scientists, accountants, and doctors).

TIMSS (Trends in International Mathematics and Science Study) has the goal of helping countries make informed decisions about how to improve teaching and learning in mathematics and

science. This TIMSS 2011 report summarizes the results of the TIMSS 2011 international mathematics assessment of fourth and eighth grade students in countries around the world. As the fifth assessment in a regular program of student assessment conducted every four years since 1995, TIMSS 2011 provides participating countries with a wealth of information about trends in the mathematics knowledge and skills of their students. At the heart of TIMSS is a wide-ranging state-of-the-art assessment of how well students master the essential mathematics content, concepts, and procedures that countries expect them to learn as they progress through primary and lower secondary school.

Student achievement on the TIMSS 2011 mathematics assessment is summarized in a variety of ways, beginning with trends over time in mathematics achievement overall as well as in its major component areas (e.g., algebra, geometry, etc.). The results also monitor progress toward the TIMSS International Benchmarks of mathematics achievement—advanced, high, intermediate, and low. Recognizing that student mathematics achievement is the result of a complex interplay of societal, school, and home environmental factors, this TIMSS mathematics report embeds the achievement results in the context of the major influences on student learning, including the scope and coverage of the mathematics curriculum, home support for student learning, school resources and learning climate, teacher preparation for mathematics instruction, and student engagement in classroom learning.

Countries Participating in TIMSS 2011

TIMSS 2011 continues the series of mathematics and science assessments conducted by the International Association for the Evaluation of Educational Achievement (IEA). IEA is an independent international cooperative of national research institutions and government agencies with nearly 70 member countries worldwide. IEA has a permanent secretariat based in Amsterdam, and a thriving data processing and research center in Hamburg (the IEA DPC). The decision to participate in an IEA study is coordinated through the IEA Secretariat in Amsterdam and made solely by each member country according to its own data needs and resources.

Exhibit 1 shows the 63 countries participating in TIMSS 2011, including some distinct education systems within countries that have always participated separately throughout IEA's long history (e.g., the Dutch-speaking part of Belgium and Hong Kong SAR). In addition, TIMSS 2011 had 14 benchmarking participants, including three Canadian provinces, nine US states, and

Exhibit 1: **Countries Participating in TIMSS 2011**

Armenia
Australia
Austria
Azerbaijan
Bahrain
Belgium (Flemish)
Botswana
Chile
Chinese Taipei
Croatia
Czech Republic
Denmark
England
Finland
Georgia
Germany
Ghana
Honduras
Hong Kong SAR
Hungary
Indonesia
Iran, Islamic Rep. of
Ireland
Israel
Italy
Japan
Jordan
Kazakhstan
Korea, Rep. of
Kuwait
Lebanon
Lithuania
Macedonia
Malaysia
Malta
Morocco
The Netherlands
New Zealand
Northern Ireland
Norway
Oman
Palestinian Nat'l Auth.
Poland
Portugal
Qatar
Romania
Russian Federation
Saudi Arabia
Serbia
Singapore
Slovak Republic
Slovenia
South Africa
Spain
Sweden
Syrian Arab Republic
Thailand
Tunisia
Turkey
Ukraine
United Arab Emirates
United States
Yemen

Benchmarking Participants

Alberta, Canada
Ontario, Canada
Quebec, Canada
Abu Dhabi, UAE
Dubai, UAE
Alabama, USA
California, USA
Colorado, USA
Connecticut, USA
Florida, USA
Indiana, USA
Massachusetts, USA
Minnesota, USA
North Carolina, USA

two emirates from the United Arab Emirates. Countries and benchmarking participants could elect to participate in the fourth grade assessment, the eighth grade assessment, or both. Fifty-two countries and seven benchmarking participants administered the fourth grade assessment, and 45 countries and 14 benchmarking participants administered the eighth grade assessment.

Also, countries where students were expected to find the TIMSS assessments too difficult for their fourth or eighth grade students were given the option to assess students at a higher grade. Accordingly, three countries administered the fourth grade assessment to their sixth grade students and the eighth grade assessment to their ninth grade students.

In each country, nationally representative samples of approximately 4,000 students from 150–200 schools participated in TIMSS 2011 at each grade assessed. In total, more than 300,000 students participated in the TIMSS 2011 fourth grade assessment and a further 300,000 in the eighth grade assessment.

The TIMSS Trend Assessments in Mathematics and Science

IEA pioneered international comparative assessments of educational achievement to gain a deeper understanding of the effects of policies and practices across countries' different systems of education. IEA began its pioneering work in the 1960's with an international study of mathematics achievement, and mathematics has remained a major focus throughout its 50-year history of educational research. First administered in 1995, IEA's TIMSS is an integrated assessment of mathematics and science that has been conducted every four years since then. TIMSS is directed by IEA's TIMSS & PIRLS International Study Center at Boston College.

With assessments in 1995, 1999, 2003, 2007, and 2011, TIMSS has measured international student achievement in mathematics and science over a 16-year period, providing an unrivalled data resource for trends in mathematics and science achievement. All of the countries, institutions, and agencies involved in successive TIMSS assessments have worked collaboratively in building the most comprehensive and innovative measures of mathematics and science achievement possible, beginning in 1995 and improving with each successive assessment. Appendix A shows the participation in earlier TIMSS assessments by each TIMSS 2011 participant.

With its strong curricular focus and emphasis on policy relevant information about the home, school, and classroom contexts, TIMSS is a valuable tool that countries can use to evaluate achievement goals and standards and monitor student achievement trends in an international context.

New Policy-relevant Context Questionnaire Scales

TIMSS 2011 provides extensive information about home supports and school environments for teaching and learning. In particular, in 2011 the trend cycles of IEA's TIMSS and PIRLS international assessments came together producing a synergy that led to advancements in the quality of background data collected by both projects. Because PIRLS (Progress in International Reading Literacy Study) also assesses students at the fourth grade, the alignment of the two projects provided the opportunity for countries to assess the same fourth grade students in reading, mathematics, and science in conjunction with the extensive background data collected by IEA assessments—most notably, allowing TIMSS to benefit from the *PIRLS Learning to Read Survey*, completed by students' parents or caregivers.

Having almost 40 countries participate in both assessments required a great deal of coordination, innovation, and creativity, most notably in the area of background data collection. The *TIMSS 2011 Student Questionnaires, Teacher Questionnaires, School Questionnaires*, and *Curriculum Questionnaires* were developed jointly by TIMSS and PIRLS participants, including several joint meetings of the TIMSS 2011 Questionnaire Item Review Committee and the PIRLS 2011 Questionnaire Development Group. This effort yielded nearly 20 new context questionnaire scales about learning and teaching developed in parallel across reading, mathematics, and science. Underpinning a new approach to interpreting the questionnaire data, each context questionnaire scale was created using IRT methods, and results presented for three regions of the scale (most to least desirable) using scale score equivalents of response combinations to determine the cutpoints for the regions.

The TIMSS 2011 Mathematics Assessment

The TIMSS 2011 mathematics assessment is based on a comprehensive framework developed collaboratively with the participating countries. As described in the mathematics chapter of the *TIMSS 2011 Assessment Frameworks* (Mullis, Martin, Ruddock, O'Sullivan, & Preuschoff, 2009), at each grade the mathematics framework is organized around two dimensions: a content dimension specifying the domains or subject matter to be assessed within mathematics, and a cognitive dimension specifying the domains or thinking processes to be assessed. The content domains and the topic areas within the domains are described separately for the fourth and eighth grades, with each topic area elaborated with specific objectives.

There are three content domains for the TIMSS 2011 fourth grade assessment:

- Number;
- Geometric Shapes and Measures; and
- Data Display.

The eighth grade assessment has four content domains:

- Number;
- Algebra;
- Geometry; and
- Data and Chance.

The following three cognitive domains describe the sets of behaviors expected of students as they engage with the mathematics content:

- Knowing;
- Applying; and
- Reasoning.

These cognitive domains are the same for both grades, encompassing a range of cognitive processes involved in working mathematically and solving problems throughout the primary and middle school years.

Given the frameworks' broad coverage goals, the mathematics assessment item pools were necessarily large—175 and 217 assessment items at the fourth and eighth grades, respectively—with approximately half being multiple choice questions and half being in a constructed response format where students write their answers (see item counts by domain in Appendix B.1 and B.2). To keep response burden to a minimum, each student participating in the assessment responded to just a subset of the item pool, with IRT scaling being used to estimate achievement on the assessment as a whole.

About 60 percent of the assessment items at each grade were retained from previous TIMSS assessments (2003 and 2007) to provide a foundation for measuring trends in mathematics achievement across assessments; the remaining 40 percent were developed for TIMSS 2011.

Developing the assessment materials for TIMSS 2011 was a cooperative venture, involving the National Research Coordinators (NRCs) from the participating countries throughout the entire process. Having reviewed their national mathematics curricula in the light of the TIMSS assessment approach,

NRCs met to update the assessment framework for 2011 in terms of the balance of content and cognitive domain coverage and the assessment topics to be included. To develop the assessment items needed for the field test, the TIMSS & PIRLS International Study Center conducted an item-writing workshop for NRCs and their colleagues with particular backgrounds in mathematics assessment and item development. Participating countries field tested the items and scoring guides with representative samples of students, and the results were scrutinized internally by the TIMSS 2011 panel of internationally recognized experts—the Science and Mathematics Item Review Committee.

Quality Assurance

The TIMSS mathematics assessments were given to carefully selected and well-documented probability samples of students at the fourth and eighth grades. The student sampling for TIMSS 2011 was conducted with careful attention to quality and comparability. Staff from Statistics Canada and the IEA DPC worked with National Research Coordinators on all phases of the sampling activities. The Statistics Canada sampling experts, in conjunction with the TIMSS 2011 sampling referee (Keith Rust, Westat, Inc.), evaluated the quality of the samples and found high levels of compliance with sampling and participation requirements, with the exception of a few cases that are annotated in the report. Appendix C provides detail about the national target population coverage and sampling participation rates.

TIMSS 2011 made every effort to attend to the quality and comparability of the data through careful planning and documentation, cooperation among participating countries, standardized procedures, and rigorous attention to quality control throughout. For example, an extensive series of verification checks was conducted to ensure the comparability of the translations of the assessment items and questionnaires, detailed documentation was required to satisfy adherence to the sampling standards, and an ambitious quality assurance program was conducted to monitor the data collection.

TIMSS 2011 Reports

The results from TIMSS 2011 are presented in a series of major reports.

- This present report, *TIMSS 2011 International Results in Mathematics*, summarizes fourth and eighth grade students' mathematics achievement in each of the 63 participating countries and 14 regional benchmarking jurisdictions, and describes the educational contexts for mathematics

instruction. It includes trends in mathematics achievement over time for participants in previous TIMSS assessments in 1995, 1999, 2003, and 2007 as well as student performance at the TIMSS International Benchmarks. Achievement results also are presented for mathematics content and cognitive domains. The Mathematics Report presents a rich array of information about students' backgrounds and attitudes toward mathematics, the mathematics curriculum, teachers' education and training, classroom characteristics and activities, and school contexts for mathematics learning and instruction.

- As a complement to this volume, the *TIMSS 2011 International Results in Science* (Martin, Mullis, Foy, & Stanco, 2012) summarizes fourth and eighth grade students' science achievement in each of the 63 participating countries and 14 regional benchmarking jurisdictions, and describes the educational contexts for science instruction. It includes trends in science achievement over time for participants in previous TIMSS assessments in 1995, 1999, 2003, and 2007 as well as student performance at the TIMSS International Benchmarks. Achievement results also are presented for science content and cognitive domains. The Science Report presents a rich array of information about students' backgrounds and attitudes toward science, the science curriculum, teachers' education and training, classroom characteristics and activities, and school contexts for science learning and instruction.

- The *TIMSS 2011 Encyclopedia: Education Policy and Curriculum in Mathematics and Science, Volumes 1 and 2* (Mullis, Martin, Minnich, Stanco, Arora, Centurino, & Castle, 2012) describes national contexts for mathematics and science teaching and learning in the 63 countries and several of the regional benchmarking jurisdictions that participated in TIMSS 2011. A chapter prepared by each participant summarizes the structure of its education system, the mathematics and science curricula and instruction in primary and secondary grades, the teacher education requirements, and the types of examinations and assessments employed. Together with selected supporting data about the countries' curricula collected via online questionnaires, the chapters comprising the two volumes of the *TIMSS 2011 Encyclopedia* provide an important resource for helping to understand the teaching and learning of mathematics and science around the world, with particular emphasis on schooling through the eighth grade.

- The online publication, *Methods and Procedures in TIMSS and PIRLS 2011* (Martin & Mullis, 2012), describes the methods and

procedures used to develop, implement, and analyze the results from TIMSS 2011 and is available from the TIMSS & PIRLS International Study Center's website: http://timssandpirls.bc.edu.

The fully documented TIMSS 2011 international database can be downloaded from the TIMSS & PIRLS International Study Center's website.

In addition, special analyses are being conducted using the TIMSS and PIRLS database of fourth grade students. This report, *TIMSS and PIRLS 2011: Relationships among Reading, Mathematics, and Science Achievement—Implications for Early Learning*, consists of in-depth analyses of fourth grade student achievement in reading, mathematics, and science in the countries that administered TIMSS and PIRLS to the same students in 2011. The report addresses four issues:

- Are primary schools providing a solid foundation in core subjects—reading, mathematics, and science?
- How does reading ability impact mathematics and science achievement?
- What are the characteristics of effective schools in reading, mathematics, and science? and
- How do homes support literacy and numeracy?



Chapter 1

International Student Achievement in Mathematics

East Asian countries continue to lead the world in mathematics achievement. Singapore, Korea, and Hong Kong SAR, followed by Chinese Taipei and Japan, were the top-performing countries in TIMSS 2011 at the fourth grade. Similarly, at the eighth grade, Korea, Singapore, and Chinese Taipei outperformed all countries, followed by Hong Kong SAR and Japan.

Since 1995, fourth grade students have shown more improvement than reduction in mathematics achievement (12 countries up vs. only 3 down), but improving eighth grade student achievement has been more difficult (9 up vs. 11 down).

Chapter 1 contains the mathematics achievement results for the 52 countries and seven benchmarking participants in the fourth grade TIMSS 2011 assessment and the 45 countries and 14 benchmarking participants in the eighth grade TIMSS 2011 assessment. To summarize mathematics achievement across the participants at fourth and eighth grades, the chapter provides:

- Averages (means) and distributions of mathematics achievement;
- Trends in mathematics achievement over time for participants in previous TIMSS assessments in 1995, 1999, 2003 and 2007;
- Trends across grades—relative achievement of 2007 fourth grade cohort as eighth grade students in 2011;
- Achievement differences by gender; and
- Trends in achievement differences by gender.

The results for percentages of students reaching the TIMSS International Benchmarks (Advanced, High, Intermediate, and Low) are presented in Chapter 2.

Mathematics Achievement Across Countries

TIMSS 2011 Mathematics Achievement

This section reports the TIMSS 2011 mathematics results as average scores and distributions on the fourth and eighth grade TIMSS scales, each of which has a range of 0–1,000 (although student performance typically ranges between 300 and 700). The TIMSS mathematics achievement scales were established in TIMSS 1995 based on the achievement distribution across all participating countries, treating each country equally. At each grade level, the scale centerpoint of 500 was set to correspond to the mean of the overall achievement distribution, and 100 points on the scale was set to correspond to the standard deviation. Achievement data from subsequent TIMSS assessment cycles were linked to these scales so that increases or decreases in average achievement may be monitored across assessments.[1] TIMSS uses the scale centerpoint as a point of reference that remains constant from assessment to assessment.

Exhibit 1.1 shows the distributions of student achievement for the participants in the TIMSS 2011 fourth grade assessment, including the average scale score with its 95 percent confidence interval and the ranges in performance for the middle half of the students (25th to 75th percentiles) as well as the extremes (5th and 95th percentiles). Similarly, Exhibit 1.2 shows the distribution

1 Please see *Methods and Procedures in TIMSS and PIRLS 2011* on the TIMSS and PIRLS website for further detail (http://timssandpirls.bc.edu).

of mathematics achievement for participants in the TIMSS 2011 eighth grade assessment.

The first page of Exhibit 1.1 presents the results for the 50 countries that assessed students at the TIMSS target population of the fourth grade. In particular, the TIMSS target population for the fourth grade assessment is the grade that represents four years of schooling, counting from the first year of ISCED Level 1.[2] Level 1 corresponds to primary education or the first stage of basic education, with the first year of Level 1 marking "systematic apprenticeship of reading, writing, and mathematics." However, IEA has a policy that children should be at least 9 years old before being asked to participate in a paper-and-pencil assessment such as TIMSS. Thus, as a policy, TIMSS also tries to ensure that, at the time of testing, students do not fall under the minimum average age of 9.5 years old. So, England, Malta, and New Zealand, where students start school at a young age, were assessed in their fifth year of schooling, but still have among the youngest students and are reported together with the fourth grade countries. Exhibit C.1 in Appendix C shows the grades and average ages of the students tested across countries, together with information about the policies and practices related to age of entry to primary school. The *TIMSS 2011 Encyclopedia* contains further details, such as countries' policies about promotion and retention.

The second page of Exhibit 1.1 shows the results for several countries that assessed their sixth grade students. To meet the needs of the increasing number of developing countries wanting to participate in TIMSS 2011, the TIMSS & PIRLS International Study Center encouraged countries where the assessment was too difficult for fourth grade students to give the TIMSS fourth grade assessment at the sixth grade. Three countries elected to assess sixth grade students, including Botswana, Honduras, and Yemen (which also assessed its fourth grade students).

The second page of Exhibit 1.1 also presents the results for the TIMSS 2011 fourth grade benchmarking participants. The benchmarking participants followed the same procedures and met the same standards as the countries, the difference being that they are regional entities of countries. Benchmarking participants at the fourth grade included Florida and North Carolina (US states), Alberta, Ontario, and Québec (Canadian provinces), and Dubai and Abu Dhabi (emirates of the United Arab Emirates).

Following the same approach as Exhibit 1.1, the first page of Exhibit 1.2 presents the results for the 42 countries that assessed students at the TIMSS

2 ISCED stands for the International Standard Classification of Education developed by the UNESCO Institute for Statistics (OECD, 1999).

target population of eighth grade, the grade that represents eight years of schooling. For the TIMSS eighth grade assessment, IEA has a policy that students should be at least 13 years old before being asked to participate. Thus, for this assessment, TIMSS tries to ensure that, at the time of testing, students do not fall under the minimum average age of 13.5 years old. So, England and New Zealand, where students start school at a young age, are reported together with the eighth grade countries. Exhibit C.1 in Appendix C shows the grades and averages ages of students at the time of testing across countries, together with policies related to age of entry into school.

As with the fourth grade, the TIMSS & PIRLS International Study Center encouraged countries where the TIMSS eighth grade assessment was too difficult for eighth grade students to instead assess students at a higher grade. The second page of Exhibit 1.2 shows the results for three countries that assessed their ninth grade students—Botswana, Honduras, and South Africa.

The second page of Exhibit 1.2 also presents the results for the TIMSS 2011 eighth grade benchmarking participants. Benchmarking participants at the eighth grade included nine US states (Alabama, California, Colorado, Connecticut, Florida, Indiana, Massachusetts, Minnesota, and North Carolina), three Canadian provinces (Alberta, Ontario, and Québec), and two emirates (Dubai and Abu Dhabi).

For each section of Exhibit 1.1 and in Exhibit 1.2, participants are shown in decreasing order of average achievement. Also, there is a symbol by a participant's average scale score indicating if the average achievement is significantly higher (up arrow) or lower (down arrow) than the scale centerpoint of 500. TIMSS uses the centerpoint of the scale as a point of reference that remains constant from assessment to assessment. (In contrast, the international average, obtained by averaging across the mean scores for each of the participating countries, changes from assessment to assessment as the number and characteristics of the participating countries change.) Finally, several countries have annotations about 1) population coverage (detailed in Exhibit C.2); 2) sampling participation rates (explained in Exhibit C.8); and 3) the potential for bias in their achievement estimates (explained in the section after next).

Achievement in TIMSS 2011 at the Fourth Grade

The results in Exhibit 1.1 (first page) show that many countries performed well in TIMSS 2011 at the fourth grade, with 24 countries having higher achievement

than the scale centerpoint of 500 and several countries having average achievement above the High International Benchmark of 550. Because there are often relatively small differences between participants in average achievement, Exhibit 1.3 shows whether or not the differences in average achievement among the countries are statistically significant.

Singapore, Korea, and Hong Kong SAR were the top-performing countries in TIMSS 2011 at the fourth grade. Looking at the results in Exhibit 1.1 and taking into account the information in Exhibit 1.3, it can be seen that these three countries performed similarly and had higher achievement than all of the other countries. The next highest-performing country was Chinese Taipei, which had higher achievement than all countries except the three with the highest achievement, followed by Japan, which had average achievement higher than all countries except Chinese Taipei and the three top performers. Also included in the top ten high-achieving countries were Northern Ireland, Belgium (Flemish), Finland, England, and the Russian Federation. The benchmarking states of Florida and North Carolina had performance similar to these countries.

While there were small differences from country to country, there was a substantial range in performance from the top-performing to the lower-performing countries. Twenty-two countries had average achievement below the TIMSS centerpoint of 500. For the most part, these countries had average achievement above the Low (400) International Benchmark.

Very Low Performance on TIMSS 2011

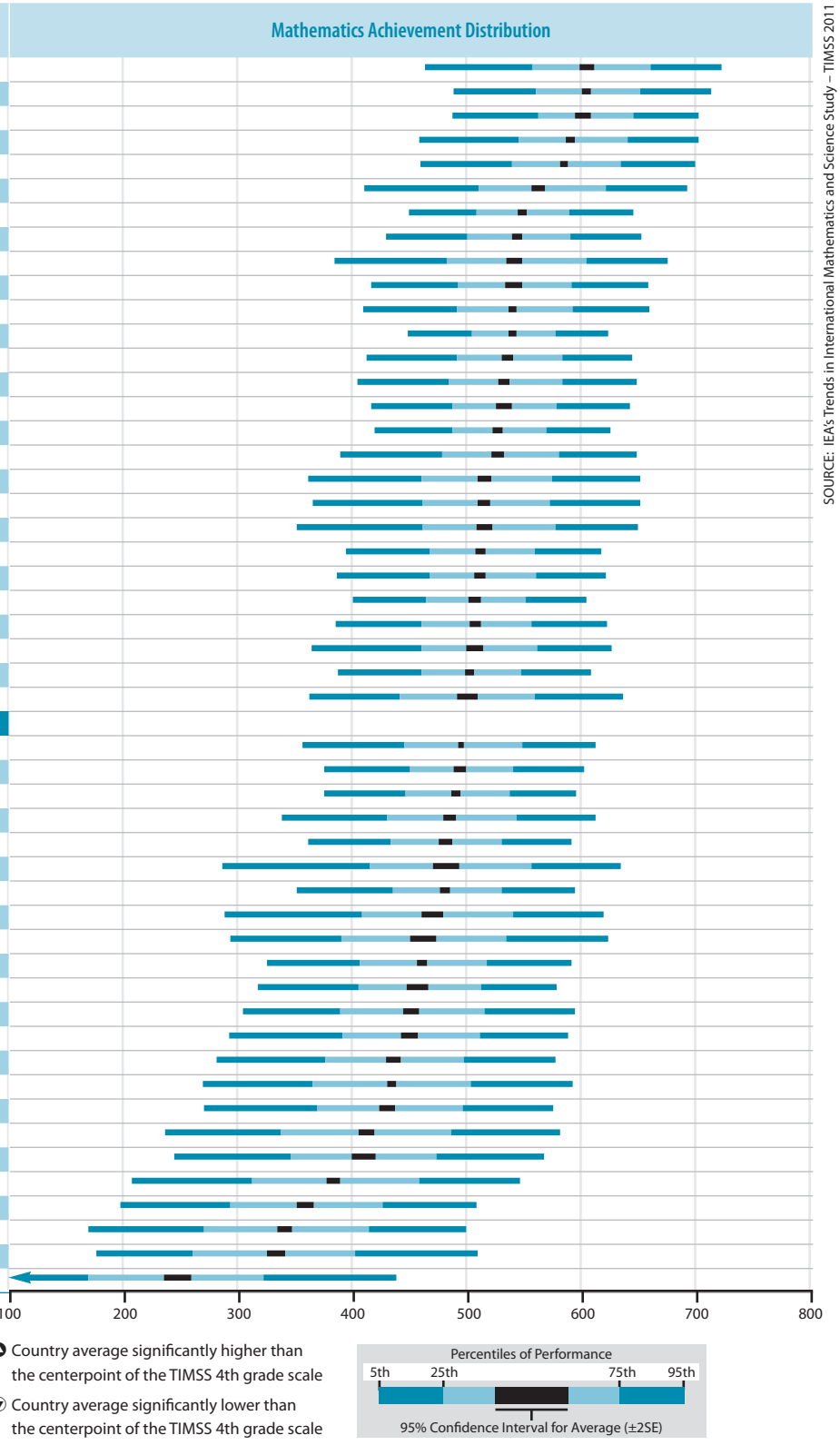
It is a well-known principle of educational measurement that the difficulty of the items used to assess student achievement should match the ability of the students taking the assessment. In the context of assessing mathematics achievement, measurement is most efficient when there is a reasonable match between the mathematics ability level of the student population being assessed and the difficulty of the assessment items. The greater the mismatch, the more difficult it becomes to achieve reliable measurement. In particular, when the assessment tasks are much too challenging for most students, to the extent that many students are responding at chance level, it is extremely difficult to achieve acceptable measurement quality.

Monitoring trends over time is particularly problematic for a country with a high degree of mismatch between assessment difficulty and student achievement. If there are substantial numbers of students with very low scores, their achievement is likely to be overestimated and consequently the overall

Exhibit 1.1: Distribution of Mathematics Achievement

TIMSS 2011 Mathematics 4th Grade

Country	Average Scale Score
[2] Singapore	606 (3.2) ▲
Korea, Rep. of	605 (1.9) ▲
[2] Hong Kong SAR	602 (3.4) ▲
Chinese Taipei	591 (2.0) ▲
Japan	585 (1.7) ▲
† Northern Ireland	562 (2.9) ▲
Belgium (Flemish)	549 (1.9) ▲
Finland	545 (2.3) ▲
England	542 (3.5) ▲
Russian Federation	542 (3.7) ▲
[2] United States	541 (1.8) ▲
† Netherlands	540 (1.7) ▲
[2] Denmark	537 (2.6) ▲
[1 2] Lithuania	534 (2.4) ▲
Portugal	532 (3.4) ▲
Germany	528 (2.2) ▲
Ireland	527 (2.6) ▲
[2] Serbia	516 (3.0) ▲
Australia	516 (2.9) ▲
Hungary	515 (3.4) ▲
Slovenia	513 (2.2) ▲
Czech Republic	511 (2.4) ▲
Austria	508 (2.6) ▲
Italy	508 (2.6) ▲
Slovak Republic	507 (3.8)
Sweden	504 (2.0)
[2] Kazakhstan	501 (4.5)
TIMSS Scale Centerpoint	500
Malta	496 (1.3) ▼
‡ Norway	495 (2.8)
[2] Croatia	490 (1.9) ▼
New Zealand	486 (2.6) ▼
Spain	482 (2.9) ▼
Romania	482 (5.8) ▼
Poland	481 (2.2) ▼
Turkey	469 (4.7) ▼
[2] Azerbaijan	463 (5.8) ▼
Chile	462 (2.3) ▼
Thailand	458 (4.8) ▼
Armenia	452 (3.5) ▼
[1] Georgia	450 (3.7) ▼
Bahrain	436 (3.3) ▼
United Arab Emirates	434 (2.0) ▼
Iran, Islamic Rep. of	431 (3.5) ▼
[2] Qatar	413 (3.5) ▼
Saudi Arabia	410 (5.3) ▼
Ψ Oman	385 (2.9) ▼
Ψ Tunisia	359 (3.9) ▼
[1] ж Kuwait	342 (3.4) ▼
ж Morocco	335 (4.0) ▼
ж Yemen	248 (6.0) ▼



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

ж Average achievement not reliably measured because the percentage of students with achievement too low for estimation exceeds 25%.

Ψ Reservations about reliability of average achievement because the percentage of students with achievement too low for estimation does not exceed 25% but exceeds 15%.

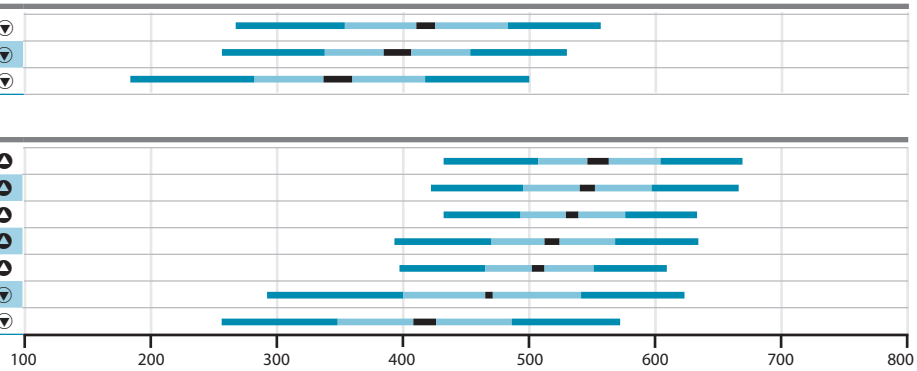
See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Exhibit 1.1: Distribution of Mathematics Achievement (Continued)

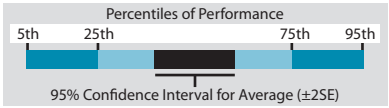
TIMSS 2011 Mathematics 4th Grade

Country	Average Scale Score	Mathematics Achievement Distribution
Sixth Grade Participants		
Botswana	419 (3.7) ▼	
Ψ Honduras	396 (5.5) ▼	
Ж Yemen	348 (5.7) ▼	
Benchmarking Participants		
1 2 North Carolina, US	554 (4.2) ▲	
1 3 Florida, US	545 (2.9) ▲	
Quebec, Canada	533 (2.4) ▲	
Ontario, Canada	518 (3.1) ▲	
2 Alberta, Canada	507 (2.5) ▲	
Dubai, UAE	468 (1.6) ▼	
Abu Dhabi, UAE	417 (4.6) ▼	



▲ Country average significantly higher than the centerpoint of the TIMSS 4th grade scale

▼ Country average significantly lower than the centerpoint of the TIMSS 4th grade scale

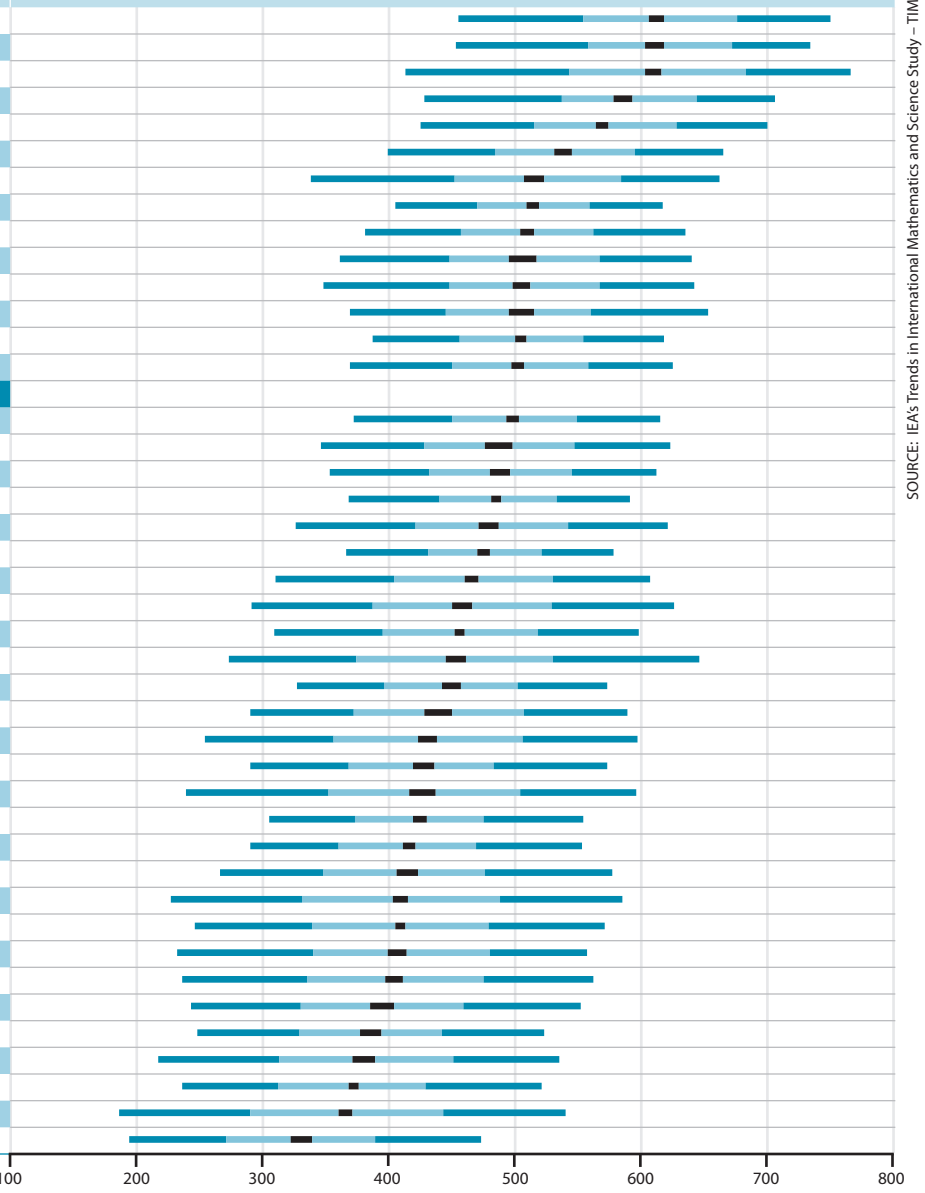


SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 1.2: Distribution of Mathematics Achievement

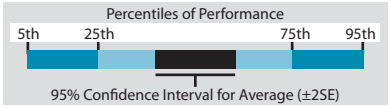
TIMSS 2011 8th Grade Mathematics

Country	Average Scale Score
Korea, Rep. of	613 (2.9) ▲
[2] Singapore	611 (3.8) ▲
Chinese Taipei	609 (3.2) ▲
Hong Kong SAR	586 (3.8) ▲
Japan	570 (2.6) ▲
[2] Russian Federation	539 (3.6) ▲
[3] Israel	516 (4.1) ▲
Finland	514 (2.5) ▲
[2] United States	509 (2.6) ▲
‡ England	507 (5.5)
Hungary	505 (3.5)
Australia	505 (5.1)
Slovenia	505 (2.2) ▲
[1] Lithuania	502 (2.5)
TIMSS Scale Centerpoint	500
Italy	498 (2.4)
New Zealand	488 (5.5) ▼
Kazakhstan	487 (4.0) ▼
Sweden	484 (1.9) ▼
Ukraine	479 (3.9) ▼
Norway	475 (2.4) ▼
Armenia	467 (2.7) ▼
Romania	458 (4.0) ▼
United Arab Emirates	456 (2.1) ▼
Turkey	452 (3.9) ▼
Lebanon	449 (3.7) ▼
Malaysia	440 (5.4) ▼
[1] Georgia	431 (3.8) ▼
Thailand	427 (4.3) ▼
Ψ Macedonia, Rep. of	426 (5.2) ▼
Tunisia	425 (2.8) ▼
Chile	416 (2.6) ▼
Ψ Iran, Islamic Rep. of	415 (4.3) ▼
Ψ Qatar	410 (3.1) ▼
Ψ Bahrain	409 (2.0) ▼
Ψ Jordan	406 (3.7) ▼
Ψ Palestinian Nat'l Auth.	404 (3.5) ▼
Ψ Saudi Arabia	394 (4.6) ▼
Ψ Indonesia	386 (4.3) ▼
Ψ Syrian Arab Republic	380 (4.5) ▼
Ж Morocco	371 (2.0) ▼
Ψ Oman	366 (2.8) ▼
Ж Ghana	331 (4.3) ▼



▲ Country average significantly higher than the centerpoint of the TIMSS 8th grade scale

▼ Country average significantly lower than the centerpoint of the TIMSS 8th grade scale



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Ж Average achievement not reliably measured because the percentage of students with achievement too low for estimation exceeds 25%.

Ψ Reservations about reliability of average achievement because the percentage of students with achievement too low for estimation does not exceed 25% but exceeds 15%.

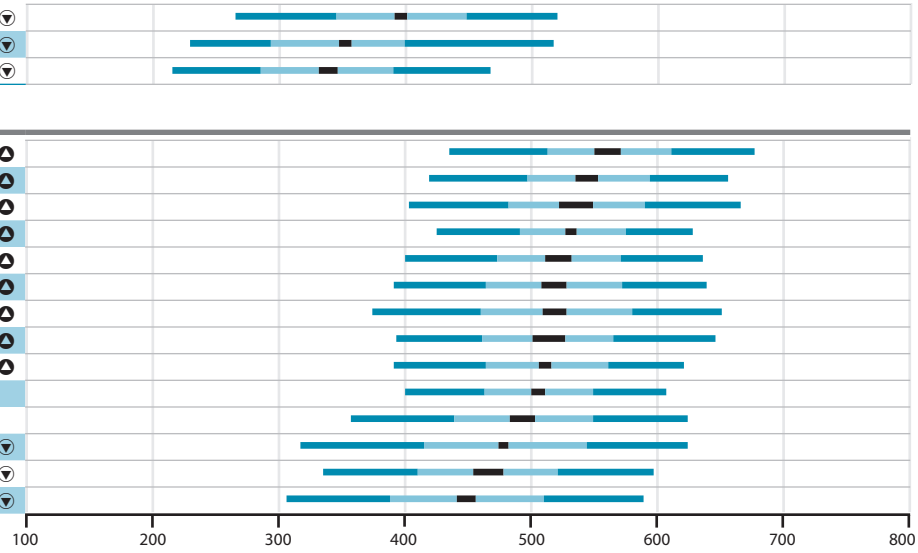
See Appendix C.3 for target population coverage notes 1, 2, and 3. See Appendix C.9 for sampling guidelines and sampling participation notes †, ‡, and ‡.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Exhibit 1.2: Distribution of Mathematics Achievement (Continued)

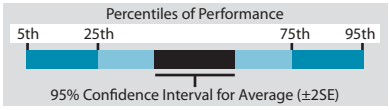
TIMSS 2011 Mathematics 8th Grade

Country	Average Scale Score	Mathematics Achievement Distribution
Ninth Grade Participants		
Ψ Botswana	397 (2.5) ▼	
Ж South Africa	352 (2.5) ▼	
2 Ж Honduras	338 (3.7) ▼	
Benchmarking Participants		
1 2 Massachusetts, US	561 (5.3) ▲	
1 Minnesota, US	545 (4.6) ▲	
1 3 North Carolina, US	537 (6.8) ▲	
Quebec, Canada	532 (2.3) ▲	
1 2 Indiana, US	522 (5.1) ▲	
1 Colorado, US	518 (4.9) ▲	
1 2 Connecticut, US	518 (4.8) ▲	
1 2 Florida, US	513 (6.4) ▲	
2 Ontario, Canada	512 (2.5) ▲	
2 Alberta, Canada	505 (2.6)	
1 2 California, US	493 (4.9)	
Dubai, UAE	478 (2.1) ▼	
1 Alabama, US	466 (5.9) ▼	
Abu Dhabi, UAE	449 (3.7) ▼	



▲ Country average significantly higher than the centerpoint of the TIMSS 8th grade scale

▼ Country average significantly lower than the centerpoint of the TIMSS 8th grade scale



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 1.3: Multiple Comparisons of Average Mathematics Achievement

TIMSS 2011 Mathematics 4th Grade

Instructions: Read across the row for a country to compare performance with the countries listed along the top of the chart. The symbols indicate whether the average achievement of the country in the row is significantly lower than that of the comparison country, significantly higher than that of the comparison country, or if there is no statistically significant difference between the average achievement of the two countries.

Country	Average Scale Score	Singapore	Korea, Rep. of	Hong Kong SAR	Chinese Taipei	Japan	Northern Ireland	Belgium (Flemish)	Finland	England	Russian Federation	United States	Netherlands	Denmark	Lithuania	Portugal	Germany	Ireland	Serbia	Australia	Hungary	Slovenia	Czech Republic	Austria	Italy	Slovak Republic	Sweden	Kazakhstan	Malta	Norway	Croatia
Singapore	606 (3.2)				▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Korea, Rep. of	605 (1.9)				▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Hong Kong SAR	602 (3.4)				▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Chinese Taipei	591 (2.0)	▼	▼	▼		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Japan	585 (1.7)	▼	▼	▼	▼		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Northern Ireland	562 (2.9)	▼	▼	▼	▼	▼		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Belgium (Flemish)	549 (1.9)	▼	▼	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Finland	545 (2.3)	▼	▼	▼	▼	▼	▼							▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
England	542 (3.5)	▼	▼	▼	▼	▼	▼								▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Russian Federation	542 (3.7)	▼	▼	▼	▼	▼	▼										▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
United States	541 (1.8)	▼	▼	▼	▼	▼	▼	▼							▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Netherlands	540 (1.7)	▼	▼	▼	▼	▼	▼	▼							▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Denmark	537 (2.6)	▼	▼	▼	▼	▼	▼	▼	▼								▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Lithuania	534 (2.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼		▼	▼						▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Portugal	532 (3.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼		▼	▼						▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Germany	528 (2.2)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Ireland	527 (2.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Serbia	516 (3.0)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼							▲		▲	▲	▲	▲	▲
Australia	516 (2.9)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼							▲		▲	▲	▲	▲	▲
Hungary	515 (3.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼									▲	▲	▲	▲	▲
Slovenia	513 (2.2)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼									▲	▲	▲	▲	▲
Czech Republic	511 (2.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼									▲		▲	▲	▲
Austria	508 (2.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼											▲	▲	▲
Italy	508 (2.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼									▲	▲	▲
Slovak Republic	507 (3.8)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼											▲	▲	▲
Sweden	504 (2.0)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼						▲	▲	▲
Kazakhstan	501 (4.5)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼									▲
Malta	496 (1.3)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼				▲
Norway	495 (2.8)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼				
Croatia	490 (1.9)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼		
New Zealand	486 (2.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	
Spain	482 (2.9)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Romania	482 (5.8)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼		
Poland	481 (2.2)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Turkey	469 (4.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Azerbaijan	463 (5.8)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Chile	462 (2.3)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Thailand	458 (4.8)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Armenia	452 (3.5)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Georgia	450 (3.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Bahrain	436 (3.3)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
United Arab Emirates	434 (2.0)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Iran, Islamic Rep. of	431 (3.5)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Qatar	413 (3.5)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Saudi Arabia	410 (5.3)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Oman	385 (2.9)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Tunisia	359 (3.9)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Kuwait	342 (3.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Morocco	335 (4.0)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Yemen	248 (6.0)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Botswana (6)	419 (3.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Honduras (6)	396 (5.5)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Yemen (6)	348 (5.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Benchmarking Participants																															
North Carolina, US	554 (4.2)	▼	▼	▼	▼	▼				▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Florida, US	545 (2.9)	▼	▼	▼	▼	▼	▼							▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Quebec, Canada	533 (2.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼						▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Ontario, Canada	518 (3.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼						▲	▲	▲	▲	▲	▲	▲	▲
Alberta, Canada	507 (2.5)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼								▲	▲	▲
Dubai, UAE	468 (1.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Abu Dhabi, UAE	417 (4.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼

Significance tests were not adjusted for multiple comparisons. Five percent of the comparisons would be statistically significant by chance alone.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 1.3: Multiple Comparisons of Average Mathematics Achievement (Continued)

▲ Average achievement significantly higher than comparison country

▼ Average achievement significantly lower than comparison country

New Zealand	Spain	Romania	Poland	Turkey	Azerbaijan	Chile	Thailand	Armenia	Georgia	Bahrain	United Arab Emirates	Iran, Islamic Rep. of	Qatar	Saudi Arabia	Oman	Tunisia	Kuwait	Morocco	Yemen	Botswana (6)	Honduras (6)	Yemen (6)	**Benchmarking Participants**	North Carolina, US	Florida, US	Quebec, Canada	Ontario, Canada	Alberta, Canada	Dubai, UAE	Abu Dhabi, UAE	Average Scale Score	**Country**
▼	▼		▼					▲	▲																						469 (4.7)	Turkey
▼	▼	▼	▼							▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲		▼	▼	▼	▼	▼		▲	463 (5.8)	Azerbaijan
▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲		▼	▼	▼	▼	▼	▼	▲	462 (2.3)	Chile
▼	▼	▼	▼							▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲		▼	▼	▼	▼	▼	▼	▲	458 (4.8)	Thailand
▼	▼	▼	▼	▼		▼				▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲		▼	▼	▼	▼	▼	▼	▲	452 (3.5)	Armenia
▼	▼	▼	▼	▼		▼				▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲		▼	▼	▼	▼	▼	▼	▲	450 (3.7)	Georgia
▼	▼	▼	▼	▼	▼	▼	▼	▼	▼				▲	▲	▲	▲	▲	▲	▲	▲	▲	▲		▼	▼	▼	▼	▼	▼	▲	436 (3.3)	Bahrain
▼	▼	▼	▼	▼	▼	▼	▼	▼	▼				▲	▲	▲	▲	▲	▲	▲	▲	▲	▲		▼	▼	▼	▼	▼	▼	▲	434 (2.0)	United Arab Emirates
▼	▼	▼	▼	▼	▼	▼	▼	▼	▼				▲	▲	▲	▲	▲	▲	▲	▲	▲	▲		▼	▼	▼	▼	▼	▼	▲	431 (3.5)	Iran, Islamic Rep. of
▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼			▲	▲	▲	▲	▲		▲	▲		▼	▼	▼	▼	▼	▼		413 (3.5)	Qatar
▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼			▲	▲	▲	▲	▲			▲		▼	▼	▼	▼	▼	▼		410 (5.3)	Saudi Arabia
▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼		▲	▲	▲	▲	▼		▲		▼	▼	▼	▼	▼	▼	▼	385 (2.9)	Oman
▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼		▲	▲	▲	▼	▼			▼	▼	▼	▼	▼	▼	▼	359 (3.9)	Tunisia
▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼			▲	▼	▼			▼	▼	▼	▼	▼	▼	▼	342 (3.4)	Kuwait
▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼			▲	▼	▼	▼		▼	▼	▼	▼	▼	▼	▼	335 (4.0)	Morocco
▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼		▼	▼	▼		▼	▼	▼	▼	▼	▼	▼	248 (6.0)	Yemen
▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼			▲	▲	▲	▲	▲		▲	▲		▼	▼	▼	▼	▼	▼		419 (3.7)	Botswana (6)
▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼			▲	▲	▲	▲	▼		▲		▼	▼	▼	▼	▼	▼	▼	396 (5.5)	Honduras (6)
▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼			▲	▲	▼	▼			▼	▼	▼	▼	▼	▼	▼	348 (5.7)	Yemen (6)
																																Benchmarking Participants
▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲				▲	▲	▲	▲	▲	554 (4.2)	North Carolina, US
▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲				▲	▲	▲	▲	▲	545 (2.9)	Florida, US
▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲		▼	▼		▲	▲	▲	▲	533 (2.4)	Quebec, Canada
▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲		▼	▼	▼		▲	▲	▲	518 (3.1)	Ontario, Canada
▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲		▼	▼	▼	▼		▲	▲	507 (2.5)	Alberta, Canada
▼	▼	▼	▼			▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲		▼	▼	▼	▼	▼		▲	468 (1.6)	Dubai, UAE
▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼			▲	▲	▲	▲	▲		▲	▲		▼	▼	▼	▼	▼	▼		417 (4.6)	Abu Dhabi, UAE

Significance tests were not adjusted for multiple comparisons. Five percent of the comparisons would be statistically significant by chance alone.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 1.4: Multiple Comparisons of Average Mathematics Achievement

TIMSS 2011 Mathematics 8th Grade

Instructions: Read across the row for a country to compare performance with the countries listed along the top of the chart. The symbols indicate whether the average achievement of the country in the row is significantly lower than that of the comparison country, significantly higher than that of the comparison country, or if there is no statistically significant difference between the average achievement of the two countries.

Country	Average Scale Score	Korea, Rep. of	Singapore	Chinese Taipei	Hong Kong SAR	Japan	Russian Federation	Israel	Finland	United States	England	Hungary	Australia	Slovenia	Lithuania	Italy	New Zealand	Kazakhstan	Sweden	Ukraine	Norway	Armenia	Romania	United Arab Emirates	Turkey	Lebanon	Malaysia	Georgia	Thailand	Macedonia, Rep. of	Tunisia
Korea, Rep. of	613 (2.9)				▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Singapore	611 (3.8)				▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Chinese Taipei	609 (3.2)				▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Hong Kong SAR	586 (3.8)	▼	▼	▼		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Japan	570 (2.6)	▼	▼	▼	▼		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Russian Federation	539 (3.6)	▼	▼	▼	▼	▼		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Israel	516 (4.1)	▼	▼	▼	▼	▼	▼					▲		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Finland	514 (2.5)	▼	▼	▼	▼	▼	▼					▲		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
United States	509 (2.6)	▼	▼	▼	▼	▼	▼									▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
England	507 (5.5)	▼	▼	▼	▼	▼	▼										▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Hungary	505 (3.5)	▼	▼	▼	▼	▼	▼	▼	▼								▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Australia	505 (5.1)	▼	▼	▼	▼	▼	▼										▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Slovenia	505 (2.2)	▼	▼	▼	▼	▼	▼	▼	▼							▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Lithuania	502 (2.5)	▼	▼	▼	▼	▼	▼	▼	▼								▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Italy	498 (2.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼				▼				▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
New Zealand	488 (5.5)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼						▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Kazakhstan	487 (4.0)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Sweden	484 (1.9)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Ukraine	479 (3.9)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼						▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Norway	475 (2.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼			▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Armenia	467 (2.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼			▲	▲	▲	▲	▲	▲	▲	▲
Romania	458 (4.0)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼						▲	▲	▲	▲	▲
United Arab Emirates	456 (2.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼					▲	▲	▲	▲	▲
Turkey	452 (3.9)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼						▲	▲	▲	▲
Lebanon	449 (3.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼						▲	▲	▲	▲
Malaysia	440 (5.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼							▲
Georgia	431 (3.8)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼					
Thailand	427 (4.3)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼					
Macedonia, Rep. of	426 (5.2)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼					
Tunisia	425 (2.8)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼				
Chile	416 (2.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼		▼
Iran, Islamic Rep. of	415 (4.3)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼		
Qatar	410 (3.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Bahrain	409 (2.0)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Jordan	406 (3.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Palestinian Nat'l Auth.	404 (3.5)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Saudi Arabia	394 (4.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Indonesia	386 (4.3)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Syrian Arab Republic	380 (4.5)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Morocco	371 (2.0)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Oman	366 (2.8)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Ghana	331 (4.3)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Botswana (9)	397 (2.5)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
South Africa (9)	352 (2.5)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Honduras (9)	338 (3.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Benchmarking Participants																															
Massachusetts, US	561 (5.3)	▼	▼	▼	▼		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Minnesota, US	545 (4.6)	▼	▼	▼	▼	▼		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
North Carolina, US	537 (6.8)	▼	▼	▼	▼	▼		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Quebec, Canada	532 (2.3)	▼	▼	▼	▼	▼		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Indiana, US	522 (5.1)	▼	▼	▼	▼	▼	▼			▲		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Colorado, US	518 (4.9)	▼	▼	▼	▼	▼	▼					▲		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Connecticut, US	518 (4.8)	▼	▼	▼	▼	▼	▼					▲		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Florida, US	513 (6.4)	▼	▼	▼	▼	▼	▼									▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Ontario, Canada	512 (2.5)	▼	▼	▼	▼	▼	▼							▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Alberta, Canada	505 (2.6)	▼	▼	▼	▼	▼	▼	▼	▼								▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
California, US	493 (4.9)	▼	▼	▼	▼	▼	▼	▼	▼	▼		▼		▼						▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Dubai, UAE	478 (2.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼		▼	▼			▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Alabama, US	466 (5.9)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼							▲	▲	▲	▲	▲	▲
Abu Dhabi, UAE	449 (3.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼						▲	▲	▲	▲

Significance tests were not adjusted for multiple comparisons. Five percent of the comparisons would be statistically significant by chance alone.
() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 1.4: Multiple Comparisons of Average Mathematics Achievement (Continued)

▲ Average achievement significantly higher than comparison country

▼ Average achievement significantly lower than comparison country

Country	Average Scale Score	Chile	Iran, Islamic Rep. of	Qatar	Bahrain	Jordan	Palestinian Nat'l Auth.	Saudi Arabia	Indonesia	Syrian Arab Republic	Morocco	Oman	Ghana	Botswana (9)	South Africa (9)	Honduras (9)	Massachusetts, US	Minnesota, US	North Carolina, US	Quebec, Canada	Indiana, US	Colorado, US	Connecticut, US	Florida, US	Ontario, Canada	Alberta, Canada	California, US	Dubai, UAE	Alabama, US	Abu Dhabi, UAE
Korea, Rep. of	613 (2.9)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Singapore	611 (3.8)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Chinese Taipei	609 (3.2)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Hong Kong SAR	586 (3.8)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Japan	570 (2.6)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Russian Federation	539 (3.6)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼				▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Israel	516 (4.1)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	▼	▼						▲	▲	▲	▲	▲
Finland	514 (2.5)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	▼	▼						▲	▲	▲	▲	▲
United States	509 (2.6)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	▼	▼	▼						▲	▲	▲	▲
England	507 (5.5)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	▼	▼								▲	▲	▲
Hungary	505 (3.5)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	▼	▼	▼	▼	▼				▲	▲	▲	▲
Australia	505 (5.1)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	▼	▼	▼							▲	▲	▲
Slovenia	505 (2.2)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	▼	▼	▼	▼	▼		▼		▲	▲	▲	▲
Lithuania	502 (2.5)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	▼	▼	▼	▼	▼		▼			▲	▲	▲
Italy	498 (2.4)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	▼	▼	▼	▼	▼	▼	▼			▲	▲	▲
New Zealand	488 (5.5)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼			▲	▲
Kazakhstan	487 (4.0)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼		▲	▲	▲
Sweden	484 (1.9)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼		▲	▲	▲
Ukraine	479 (3.9)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼			▲
Norway	475 (2.4)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼			▲
Armenia	467 (2.7)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼		▲
Romania	458 (4.0)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼		
United Arab Emirates	456 (2.1)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼		
Turkey	452 (3.9)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼		
Lebanon	449 (3.7)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	
Malaysia	440 (5.4)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	
Georgia	431 (3.8)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Thailand	427 (4.3)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Macedonia, Rep. of	426 (5.2)			▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Tunisia	425 (2.8)	▲		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Chile	416 (2.6)				▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Iran, Islamic Rep. of	415 (4.3)						▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Qatar	410 (3.1)						▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Bahrain	409 (2.0)	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Jordan	406 (3.7)	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Palestinian Nat'l Auth.	404 (3.5)	▼							▲	▲	▲	▲	▲		▲	▲	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Saudi Arabia	394 (4.6)	▼	▼	▼	▼	▼				▲	▲	▲	▲		▲	▲	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Indonesia	386 (4.3)	▼	▼	▼	▼	▼	▼				▲	▲	▲	▼	▲	▲	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Syrian Arab Republic	380 (4.5)	▼	▼	▼	▼	▼	▼	▼			▲	▲	▲	▼	▲	▲	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Morocco	371 (2.0)	▼	▼	▼	▼	▼	▼	▼	▼			▲	▲	▼	▲	▲	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Oman	366 (2.8)	▼	▼	▼	▼	▼	▼	▼	▼	▼			▲	▼	▲	▲	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Ghana	331 (4.3)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼		▼	▼		▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Botswana (9)	397 (2.5)	▼	▼	▼	▼	▼			▲	▲	▲	▲	▲		▲	▲	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
South Africa (9)	352 (2.5)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▲	▼		▲	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Honduras (9)	338 (3.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼		▼	▼		▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Benchmarking Participants																														
Massachusetts, US	561 (5.3)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Minnesota, US	545 (4.6)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼			▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
North Carolina, US	537 (6.8)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼				▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Quebec, Canada	532 (2.3)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼			▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Indiana, US	522 (5.1)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼								▲	▲	▲	▲	▲
Colorado, US	518 (4.9)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	▼	▼						▲	▲	▲	▲	▲
Connecticut, US	518 (4.8)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	▼	▼						▲	▲	▲	▲	▲
Florida, US	513 (6.4)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	▼	▼						▲	▲	▲	▲	▲
Ontario, Canada	512 (2.5)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	▼	▼						▲	▲	▲	▲	▲
Alberta, Canada	505 (2.6)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	▼	▼	▼	▼	▼			▲	▲	▲	▲	▲
California, US	493 (4.9)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼		▲	▲	▲
Dubai, UAE	478 (2.1)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼			▲
Alabama, US	466 (5.9)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼		▲
Abu Dhabi, UAE	449 (3.7)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	

Significance tests were not adjusted for multiple comparisons. Five percent of the comparisons would be statistically significant by chance alone.
() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

achievement distribution becomes biased upwards. Educators and policy makers may work hard and make real strides in improving education from this assessment cycle to the next. However, because the achievement distribution at the earlier cycle was overestimated to begin with, the country would not see evidence of this improvement in the assessment results. The apparently poor return for all of the effort could be very disheartening to those who worked so hard and could prove a disincentive to further investment and effort.

Having substantial numbers of students with very low scores in a country also makes it difficult to estimate performance separately for the mathematics content and cognitive domains. The items comprising the mathematics reasoning scale were particularly difficult for such countries.

To identify countries where performance is deemed too low to provide reliable measurement of achievement and meaningful trend comparisons, the TIMSS & PIRLS International Study Center conducted extensive investigations to detect when the quality of measurement erodes (Martin, Mullis, & Foy, in press). The proportion of students unable to respond to any items on the assessment was selected as the best indicator of degree of mismatch between students' skills and those demanded by the assessment. Although the absolute lower limit would be no items answered correctly, about half the items were in multiple-choice format and guessing on these was possible. Thus, beginning in 2011, the criterion for having achievement too low for estimation was established based on the percentage of the students having a score no higher than what a student would achieve by guessing on all the multiple-choice questions—essentially the percentage of students performing below chance.

For each country, Appendix D shows the percentage of students with achievement too low for estimation (Exhibit D.1 for the fourth grade and D.2 for the eighth grade). When, as in Kuwait, Morocco, and Yemen at the fourth grade, the percentage of students with achievement too low for estimation exceeded 25 percent, the country was annotated with the symbol Ж. Achievement trends are not reported for these countries because of concerns about bias in the estimation of achievement for the student population. When, as in Oman and Tunisia, the percentage of students with achievement too low for estimation exceeded 15 percent but did not exceed 25 percent, the country was annotated with the symbol Ψ, indicating reservations about the reliability of the achievement estimates.

Achievement in TIMSS 2011 at the Sixth Grade

As a group, the countries assessing their sixth grade students had average achievement between 348 and 419, falling at or below the Low International Benchmarks (400). This level of achievement is comparable to that of most of the lower-performing countries at the fourth grade. In addition, there was evidence of many very low-performing sixth grade students in Yemen (annotated with the symbol Ж, indicating that the percentage of students with achievement too low for estimation exceeded 25%) and to a lesser extent in Honduras (annotated with the symbol Ψ, indicating that the percentage of students with achievement too low for estimation exceeded 15% but did not exceed 25%). Despite the low average achievement of the sixth grade students in Yemen, it is noteworthy that it exceeded the average achievement of Yemen's fourth grade students by 100 points.

Achievement in TIMSS 2011 at the Eighth Grade

The results in Exhibit 1.2 (first page) show that Korea, Singapore, Chinese Taipei, Hong Kong SAR, and Japan, the five Asian countries with the highest average mathematics achievement at fourth grade, also have the highest achievement at eighth grade, with average achievement above the High International Benchmark of 550 in each case. In addition to these countries, the Russian Federation, Israel, Finland, the United States, and Slovenia had higher achievement than the scale centerpoint of 500.

Looking at the results in Exhibit 1.2 and taking into account the information in Exhibit 1.4, which shows whether or not the differences in average achievement among the countries are statistically significant, it can be seen that Korea, Singapore, and Chinese Taipei performed similarly and had higher achievement than all of the other countries. The next highest-performing country was Hong Kong SAR, which had higher achievement than all countries except the three with the highest achievement, followed by Japan, which had average achievement higher than all countries except Hong Kong SAR and the three top performers. Also included in the top ten high-achieving countries were the Russian Federation, Israel, Finland, the United States, and England. Among benchmarking participants, the state of Massachusetts was outperformed only by the four highest achieving Asian countries, while the states of Minnesota and North Carolina and the Canadian province of Québec were outperformed only by the top five countries.

While there were small differences from country to country, there was a substantial range in performance from the top-performing to the lower-performing countries. Although ten countries had average achievement above the TIMSS centerpoint of 500, twenty-seven countries had average achievement below this point, mostly falling above the Low (400) International Benchmark.

Similar to the fourth grade, a number of eighth grade participants had significant percentages of very low performing students, including Morocco and Ghana (percentage of students with achievement too low for estimation exceeded 25%), and Macedonia, Iran, Qatar, Bahrain, Jordan, Palestinian National Authority, Saudi Arabia, Indonesia, the Syrian Arab Republic, and Oman (percentage of students with achievement too low for estimation exceeded 15% but did not exceed 25%).

Achievement in TIMSS 2011 at the Ninth Grade

As a group, the countries assessing their sixth grade students had average achievement between 338 and 397, below the Low (400) International Benchmark for eighth grade students. In addition, there was evidence of many very low performing ninth grade students in all three countries, with the percentage of students with achievement too low for estimation exceeding 25 percent in South Africa and Honduras and between 15 percent and 25 percent in Botswana.

Trends in Mathematics Achievement

Exhibits 1.5 and 1.6 display changes in average mathematics achievement at fourth and eighth grades, respectively, for the countries and benchmarking participants that have comparable data from previous TIMSS assessments. For the fourth grade, there are 29 countries and four benchmarking participants having data from 1995, 2003, or 2007 that can be compared to 2011.[3] Twelve countries and two benchmarking participants have trend data from all four TIMSS fourth grade assessments. For the eighth grade (and Finland at the seventh grade), there are 34 countries and nine benchmarking participants having data from 1995, 1999, 2003, or 2007 that can be compared to 2011, including eleven countries and two benchmarking participants that have data from all five TIMSS eighth grade assessments. With the participants shown in alphabetical order, Exhibits 1.5 and 1.6 show average achievement for each assessment year, as well as achievement differences between years with an indication of statistical significance. The mathematics achievement distributions also are shown for each assessment year.

At the fourth grade, there are 17 countries and three benchmarking participants that have comparable data from 1995 and 2011 providing trends over the past 16 years. Exhibit 1.7 shows these countries ordered from most to least growth in achievement over this period, to focus on educational progress across the TIMSS assessment years and complement the complete detail in Exhibit 1.5. Exhibit 1.7 presents for the fourth grade a country-by-country graphical depiction of change in average mathematics achievement from 1995 to 2011, with growth curves aligned country-by-country to facilitate comparisons of change from assessment to assessment. That is, the same scale is used for each country (10-point intervals), but the part of the scale shown differs according to each country's average achievement. To complement Exhibit 1.6 and focus on long-term educational progress at the eighth grade, Exhibit 1.8 presents a similar depiction for the 25 countries and eight benchmarking participants that have comparable data at the eighth grade from the 1995 or 1999 and 2011 assessment years. It is particularly interesting to consider the TIMSS 2011 achievement results in light of the information countries provided in the *TIMSS 2011 Encyclopedia*. Many countries are engaged in implementing important structural, curricular, and instructional reforms and are using the TIMSS results across the assessment years to monitor the impact on achievement of these reforms. Looking at the trends in fourth grade mathematics achievement during the 1995–2011 period, there have been more countries with increases

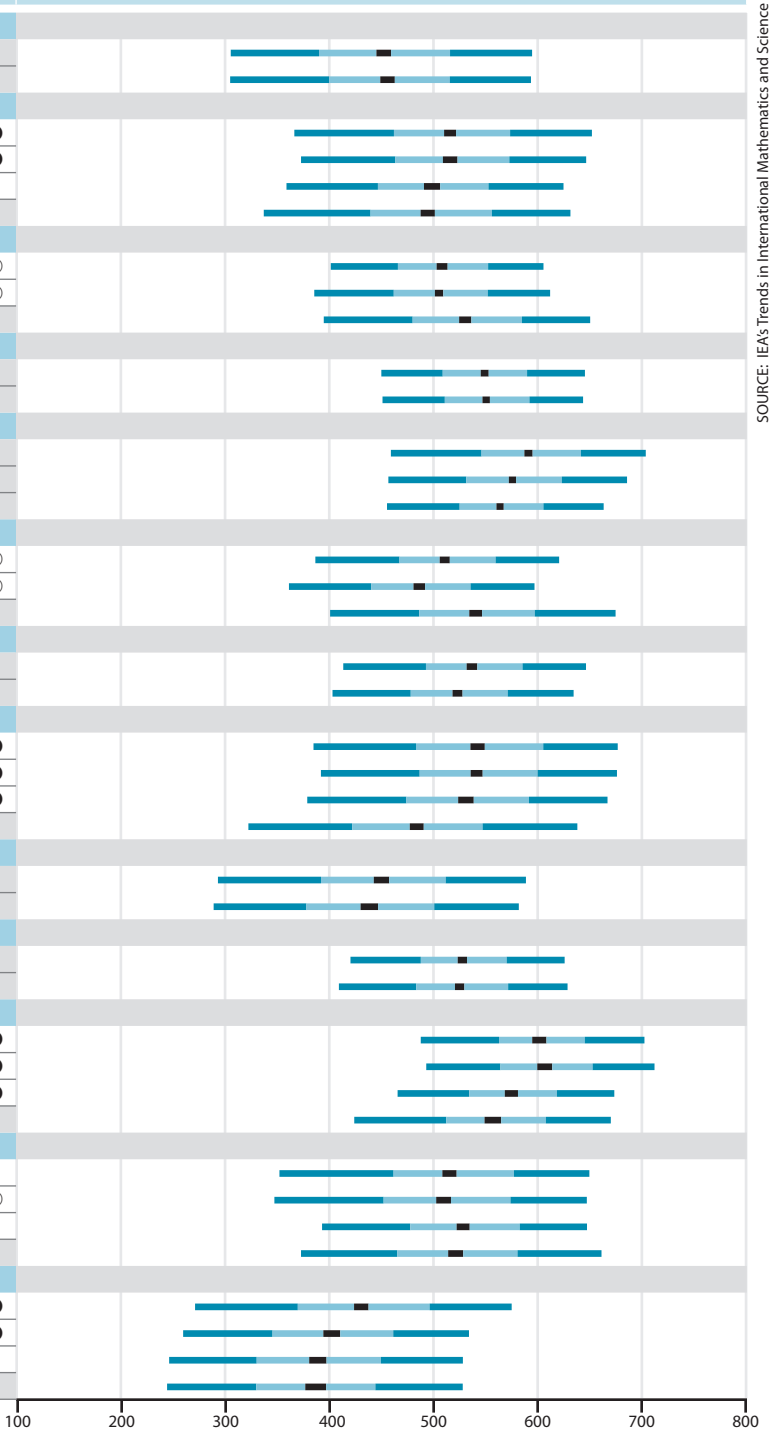
3 TIMSS 1999 did not include a fourth grade assessment.

Exhibit 1.5: Trends in Mathematics Achievement

Instructions: Read across the row to determine if the performance in the row year is significantly higher (▲) or significantly lower (▼) than the performance in the column year.

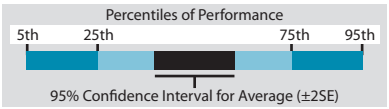
Country	Average Scale Score	Differences Between Years: 2007	2003	1995
Armenia				
2011	452 (3.5)		−4	
2003	456 (3.5)			
Australia				
2011	516 (2.9)	0	17 ▲	21 ▲
2007	516 (3.5)		17 ▲	22 ▲
† 2003	499 (3.9)			4
‡ 1995	495 (3.4)			
Austria				
2011	508 (2.6)	3		−22 ▼
2007	505 (2.0)			−25 ▼
‡ 1995	531 (2.9)			
Belgium (Flemish)				
2011	549 (1.9)		−1	
2 2003	551 (1.8)			
Chinese Taipei				
2011	591 (2.0)	15 ▲	27 ▲	
2007	576 (1.7)		12 ▲	
2003	564 (1.8)			
Czech Republic				
2011	511 (2.4)	24 ▲		−30 ▼
2007	486 (2.8)			−54 ▼
1995	541 (3.1)			
Denmark				
2 2011	537 (2.6)	14 ▲		
† 2007	523 (2.4)			
England				
2011	542 (3.5)	1	11 ▲	58 ▲
2007	541 (2.9)		10 ▲	57 ▲
† 2003	531 (3.7)			47 ▲
3 † 1995	484 (3.3)			
Georgia				
1 2011	450 (3.7)	12 ▲		
1 2007	438 (4.2)			
Germany				
2011	528 (2.2)	3		
2007	525 (2.3)			
Hong Kong SAR				
2 2011	602 (3.4)	−5	27 ▲	45 ▲
2007	607 (3.6)		32 ▲	50 ▲
† 2003	575 (3.2)			18 ▲
1995	557 (4.0)			
Hungary				
2011	515 (3.4)	6	−13 ▼	−6
2007	510 (3.5)		−19 ▼	−12 ▼
2 2003	529 (3.1)			7
1995	521 (3.6)			
Iran, Islamic Rep. of				
2011	431 (3.5)	28 ▲	42 ▲	44 ▲
2007	402 (4.1)		13 ▲	15 ▲
2 2003	389 (4.2)			2
1995	387 (5.0)			

Mathematics Achievement Distribution



▲ More recent year significantly higher

▼ More recent year significantly lower



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Ψ Reservations about reliability of average achievement because the percentage of students with achievement too low for estimation does not exceed 25% but exceeds 15%. Such annotations in exhibits with trend data began in 2011, so data from assessments prior to 2011 are not annotated for reservations.

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡.

◗◖ Tested the same cohort of students as other countries, but later in the assessment year at the beginning of the next school year.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

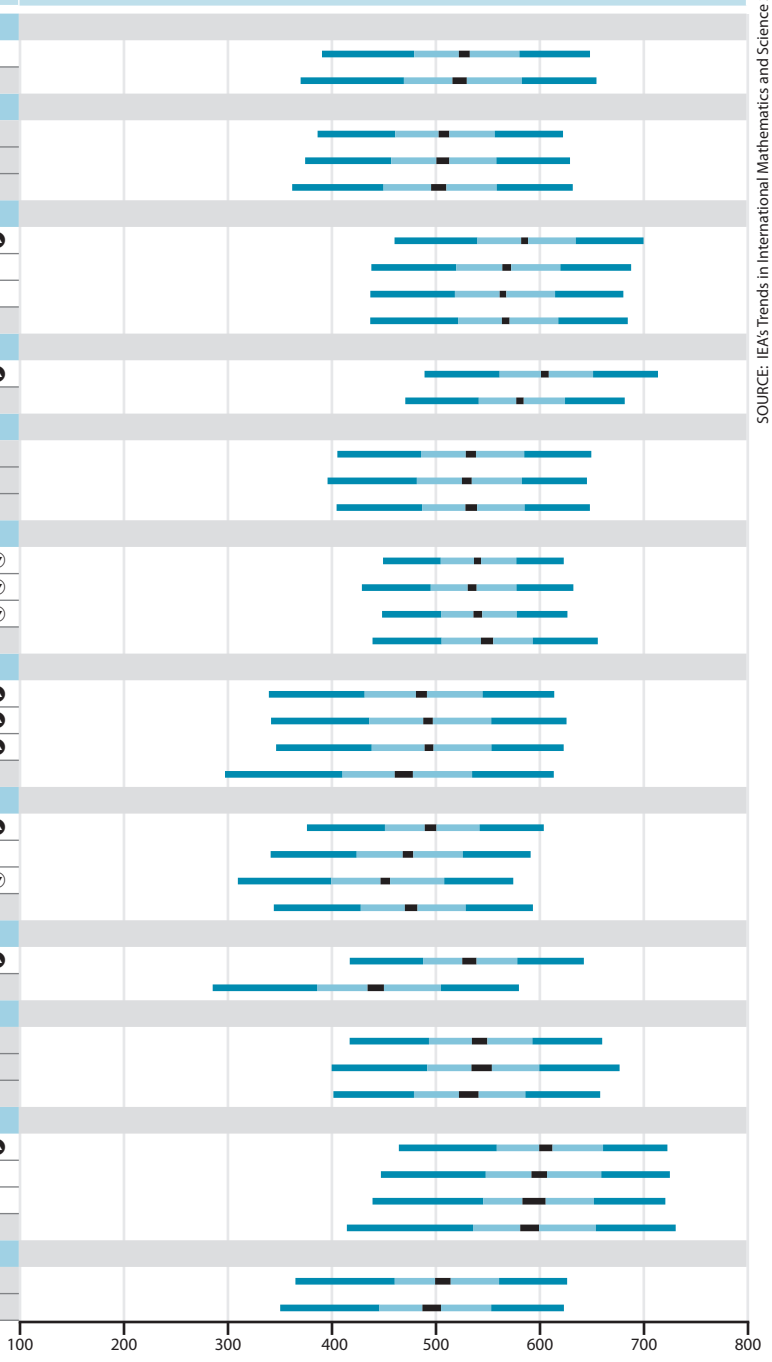
Exhibit 1.5: Trends in Mathematics Achievement (Continued)

TIMSS 2011 Mathematics 4th Grade

Instructions: Read across the row to determine if the performance in the row year is significantly higher (▲) or significantly lower (▼) than the performance in the column year.

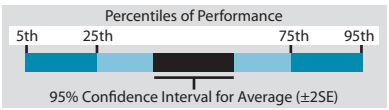
Country		Average Scale Score	Differences Between Years 2007	2003	1995
Ireland					
	2011	527 (2.6)			5
2	1995	523 (3.5)			
Italy					
	2011	508 (2.6)	1	5	
	2007	507 (3.1)		4	
	2003	503 (3.7)			
Japan					
	2011	585 (1.7)	17 ▲	21 ▲	18 ▲
	2007	568 (2.1)		4	1
	2003	565 (1.6)			–3
	1995	567 (1.9)			
Korea, Rep. of					
	2011	605 (1.9)			24 ▲
2	1995	581 (1.8)			
Lithuania					
1 2	2011	534 (2.4)	4	0	
1	2007	530 (2.4)		–4	
1	2003	534 (2.8)			
Netherlands					
†	2011	540 (1.7)	5	0	–9 ▼
‡	2007	535 (2.1)		–5	–14 ▼
†	2003	540 (2.1)			–9 ▼
‡	1995	549 (3.0)			
New Zealand					
	2011	486 (2.6)	–6	–7 ▼	17 ▲
	2007	492 (2.3)		–1	23 ▲
	2003	493 (2.2)			24 ▲
	1995	469 (4.4)			
Norway					
‡	2011	495 (2.8)	22 ▲	44 ▲	19 ▲
	2007	473 (2.5)		22 ▲	–3
	2003	451 (2.3)			–25 ▼
	1995	476 (3.0)			
Portugal					
	2011	532 (3.4)			90 ▲
2	1995	442 (3.9)			
Russian Federation					
	2011	542 (3.7)	–2	10	
	2007	544 (4.9)		12	
2	2003	532 (4.7)			
Singapore					
2	2011	606 (3.2)	6	11	16 ▲
	2007	599 (3.7)		5	9
	2003	594 (5.6)			4
	1995	590 (4.5)			
Slovak Republic					
	2011	507 (3.8)	11		
	2007	496 (4.5)			

Mathematics Achievement Distribution



▲ More recent year significantly higher

▼ More recent year significantly lower



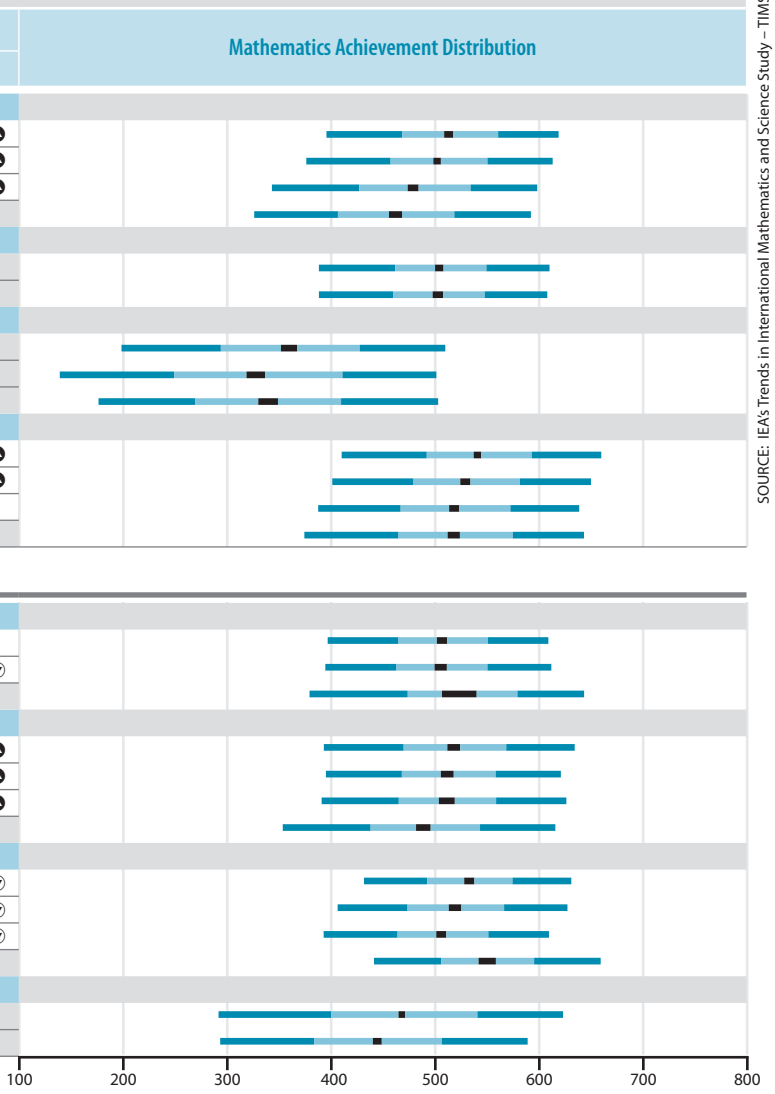
SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 1.5: Trends in Mathematics Achievement (Continued)

TIMSS 2011 Mathematics 4th Grade

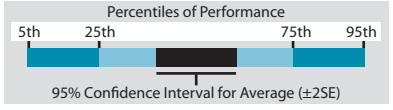
Instructions: Read across the row to determine if the performance in the row year is significantly higher (▲) or significantly lower (▼) than the performance in the column year.

Country	Average Scale Score	Differences Between Years			Mathematics Achievement Distribution
		2007	2003	1995	
Slovenia					
2011	513 (2.2)	11 ▲	34 ▲	51 ▲	
2007	502 (1.8)		23 ▲	40 ▲	
2003	479 (2.6)			17 ▲	
1995	462 (3.1)				
Sweden					
2011	504 (2.0)	1			
2007	503 (2.5)				
Tunisia					
Ψ 2011	359 (3.9)	32 ▲	20 ▲		
2007	327 (4.5)		–12		
2003	339 (4.7)				
United States					
2 2011	541 (1.8)	12 ▲	22 ▲	23 ▲	
2 † 2007	529 (2.4)		11 ▲	11 ▲	
† 2003	518 (2.4)			0	
1995	518 (2.9)				
Benchmarking Participants					
Alberta, Canada					
2 2011	507 (2.5)	1		–17	
2 2007	505 (3.0)			–18 ▼	
1995	523 (8.3)				
Ontario, Canada					
2011	518 (3.1)	6	7	29 ▲	
2 2007	512 (3.1)		0	23 ▲	
2003	511 (3.8)			23 ▲	
2 1995	489 (3.5)				
Quebec, Canada					
2011	533 (2.4)	14 ▲	27 ▲	–17 ▼	
2 2007	519 (3.0)		13 ▲	–31 ▼	
2003	506 (2.4)			–44 ▼	
1995	550 (4.2)				
Dubai, UAE					
2011	468 (1.6)	24 ▲			
⧓ ‡ 2007	444 (2.1)				



▲ More recent year significantly higher

▼ More recent year significantly lower



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

than with decreases. Of the 17 countries and three benchmarking participants with data spanning this period (see Exhibit 1.7), twelve countries and one benchmarking participant had increases in average achievement, three countries and one benchmarking participant had decreases, and two countries and one benchmarking participant had no difference. Among the countries with the greatest increase from 1995 to 2011 were Portugal, England, Slovenia, Hong Kong SAR, and Iran, with average achievement increases of more than 40 points. Australia, Korea, and the United States increased more than 20 points, as did the province of Ontario.

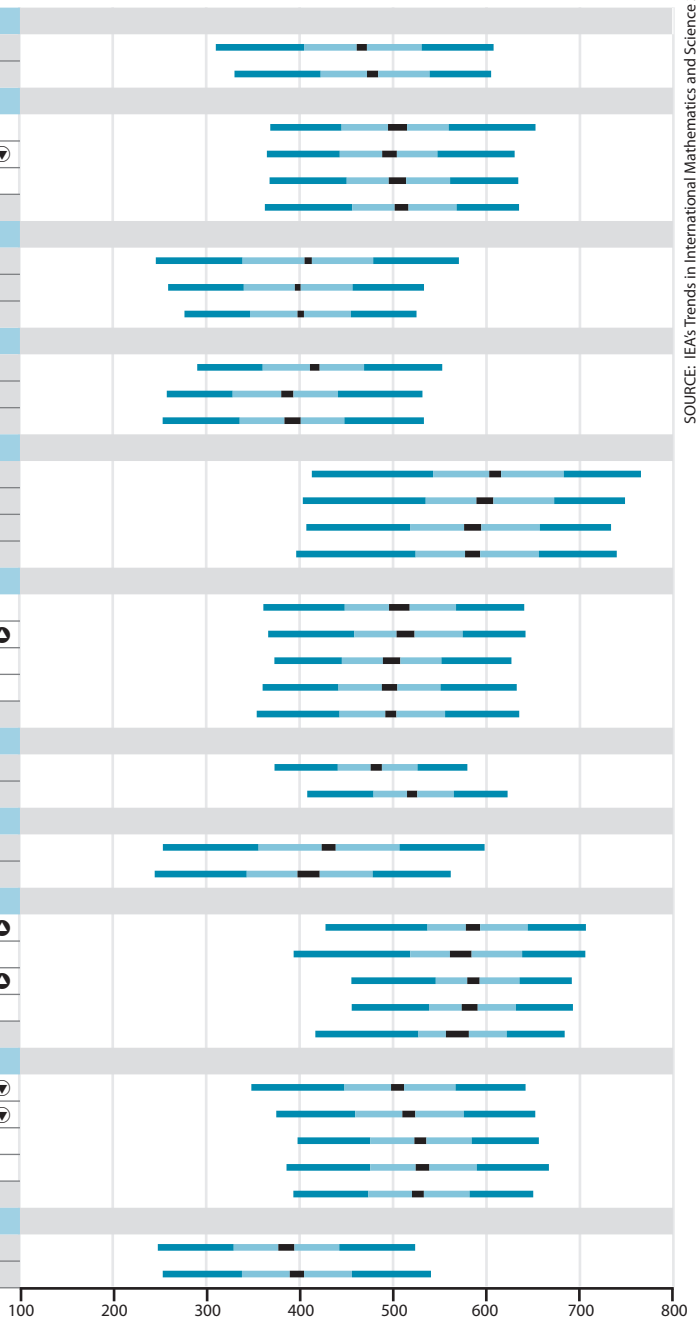
At the eighth grade, there was more balance between mathematics achievement growth and decline among countries. Of the 25 countries and eight benchmarking participants with comparable data spanning the 1995 or 1999 to 2011 period, nine countries and four benchmarking participants had increased achievement, eleven countries and two benchmarking participants had decreased achievement, and five countries and two benchmarking participants showed no difference. The countries with the greatest increases in average mathematics achievement at the eighth grade included Korea, Lithuania, Chinese Taipei, and Chile (more than 20 points), as well as Italy, the United States, Hong Kong SAR, the Russian Federation, and Slovenia (10–20 points). Countries with the greatest decreases included Thailand, Sweden, and Malaysia (40 points or more), and Macedonia, Jordan, Hungary, Tunisia, and Norway (20–40 points). Also, Finland had a comparable decrease (38 points) for its seventh grade students. Among benchmarking participants, there were increases in Massachusetts (47 points), North Carolina (42 points), Minnesota (26 points), and Ontario (11 points). Alberta and Québec had decreased achievement over the period (22 and 25 points, respectively).

Exhibit 1.6: Trends in Mathematics Achievement

TIMSS 2011 Mathematics 8th Grade

Instructions: Read across the row to determine if the performance in the row year is significantly higher (▲) or significantly lower (▼) than the performance in the column year.

Country	Average Scale Score	Differences Between Years 2007	2003	1999	1995
Armenia					
2011	467 (2.7)		−12 ▼		
2003	478 (3.0)				
Australia					
2011	505 (5.1)	9	0		−4
2007	496 (3.9)		−8		−13 ▼
2003	505 (4.6)				−4
‡ 1995	509 (3.7)				
Bahrain					
Ψ ⧓ 2011	409 (2.0)	11 ▲	8 ▲		
2007	398 (1.6)		−3		
2003	401 (1.7)				
Chile					
2011	416 (2.6)		29 ▲	24 ▲	
2003	387 (3.3)			−6	
1999	392 (4.4)				
Chinese Taipei					
2011	609 (3.2)	11 ▲	24 ▲	24 ▲	
2007	598 (4.5)		13 ▲	13 ▲	
2003	585 (4.6)			0	
1999	585 (4.0)				
England					
‡ 2011	507 (5.5)	−7	8	10	9
† 2007	513 (4.8)		15 ▲	17 ▲	16 ▲
‡ 2003	498 (4.7)			2	1
† 1999	496 (4.1)				−1
3 † 1995	498 (3.0)				
Finland (7)					
2011	482 (3.0)			−38 ▼	
1999	520 (2.7)				
Georgia					
1 2011	431 (3.8)	22 ▲			
1 2007	410 (5.9)				
Hong Kong SAR					
2011	586 (3.8)	13	0	4	17 ▲
† 2007	572 (5.8)		−14 ▼	−10	4
† 2003	586 (3.3)			4	17 ▲
† 1999	582 (4.3)				13
1995	569 (6.1)				
Hungary					
2011	505 (3.5)	−12 ▼	−24 ▼	−27 ▼	−22 ▼
2007	517 (3.5)		−12 ▼	−15 ▼	−10 ▼
2 2003	529 (3.2)			−2	3
1999	532 (3.7)				5
1995	527 (3.2)				
Indonesia					
Ψ 2011	386 (4.3)	−11			
1 2007	397 (3.8)				



▲ More recent year significantly higher

▼ More recent year significantly lower

Percentiles of Performance
5th 25th 75th 95th
95% Confidence Interval for Average (±2SE)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Ψ Reservations about reliability of average achievement because the percentage of students with achievement too low for estimation does not exceed 25% but exceeds 15%. Such annotations in exhibits with trend data began in 2011, so data from assessments prior to 2011 are not annotated for reservations.

Trend Notes: Trend results for Finland are based on 7th grade data from 1999 and 2011, and so Finland's 2011 results differ from Exhibit 1.1.

See Appendix C.3 for target population coverage notes 1, 2, and 3. See Appendix C.9 for sampling guidelines and sampling participation notes †, ‡, and ‡.

⧓ Tested the same cohort of students as other countries, but later in the assessment year at the beginning of the next school year.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Exhibit 1.6: Trends in Mathematics Achievement (Continued)

Instructions: Read across the row to determine if the performance in the row year is significantly higher (▲) or significantly lower (▼) than the performance in the column year.

Country		Average Scale Score	Differences Between Years 2007	2003	1999	1995
Iran, Islamic Rep. of						
Ψ	2011	415 (4.3)	12	4	−7	−3
	2007	403 (4.1)		−8	−19 ▼	−15 ▼
2	2003	411 (2.4)			−11 ▼	−7
	1999	422 (3.4)				4
	1995	418 (3.9)				
Italy						
	2011	498 (2.4)	19 ▲	15 ▲	19 ▲	
	2007	480 (3.0)		−4	0	
	2003	484 (3.2)			4	
2	1999	479 (3.8)				
Japan						
	2011	570 (2.6)	0	0	−9 ▼	−11 ▼
	2007	570 (2.4)		0	−9 ▼	−11 ▼
	2003	570 (2.1)			−9 ▼	−11 ▼
	1999	579 (1.7)				−2
	1995	581 (1.6)				
Jordan						
Ψ	2011	406 (3.7)	−21 ▼	−18 ▼	−22 ▼	
	2007	427 (4.1)		3	−1	
	2003	424 (4.1)			−3	
	1999	428 (3.6)				
Korea, Rep. of						
	2011	613 (2.9)	16 ▲	24 ▲	26 ▲	32 ▲
	2007	597 (2.7)		8 ▲	10 ▲	17 ▲
◆◆	2003	589 (2.2)			2	8 ▲
	1999	587 (2.0)				6 ▲
	1995	581 (2.0)				
Lebanon						
	2011	449 (3.7)	0	16 ▲		
	2007	449 (4.0)		16 ▲		
	2003	433 (3.1)				
Lithuania						
1	2011	502 (2.5)	−3	1	21 ▲	31 ▲
1	2007	506 (2.3)		4	24 ▲	34 ▲
1	2003	502 (2.5)			20 ▲	30 ▲
1 ◆◆	1999	482 (4.3)				10
1 2	1995	472 (4.1)				
Macedonia, Rep. of						
Ψ	2011	426 (5.2)		−9	−20 ▼	
3	2003	435 (3.5)			−12 ▼	
	1999	447 (4.2)				
Malaysia						
	2011	440 (5.4)	−34 ▼	−69 ▼	−79 ▼	
	2007	474 (5.0)		−34 ▼	−45 ▼	
	2003	508 (4.1)			−11	
	1999	519 (4.4)				
New Zealand						
	2011	488 (5.5)		−6	−3	−13
	2003	494 (5.3)			3	−7
	1999	491 (5.2)				−10
	1995	501 (4.7)				
Norway						
	2011	475 (2.4)	5	13 ▲		−24 ▼
	2007	469 (2.0)		8 ▲		−29 ▼
	2003	461 (2.5)				−37 ▼
	1995	498 (2.2)				

Mathematics Achievement Distribution

100 200 300 400 500 600 700 800

▲ More recent year significantly higher

▼ More recent year significantly lower

Percentiles of Performance
5th 25th 75th 95th
95% Confidence Interval for Average (±2SE)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

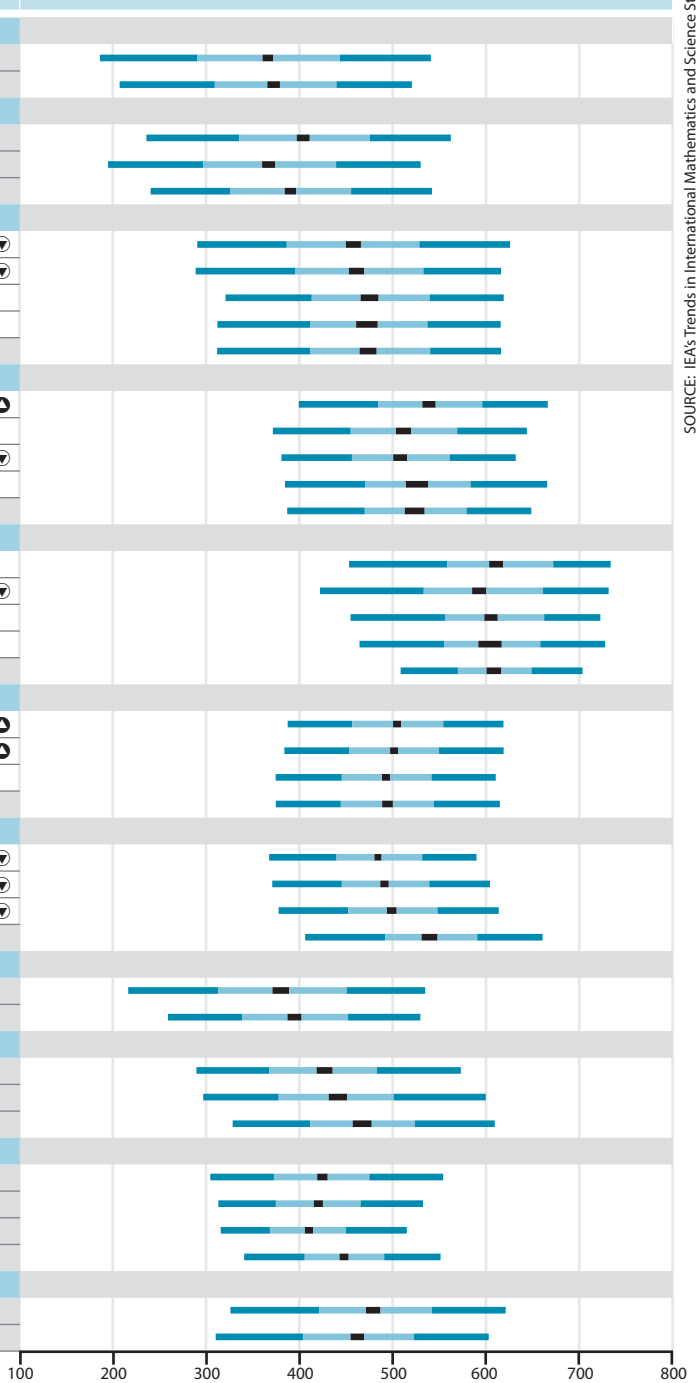
Exhibit 1.6: Trends in Mathematics Achievement (Continued)

TIMSS 2011 Mathematics 8th Grade

Instructions: Read across the row to determine if the performance in the row year is significantly higher (▲) or significantly lower (▼) than the performance in the column year.

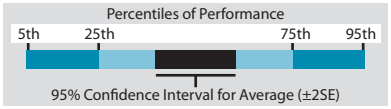
Country	Average Scale Score	Differences Between Years 2007	2003	1999	1995
Oman					
Ψ 2011	366 (2.8)	−6			
2007	372 (3.4)				
Palestinian Nat'l Auth.					
Ψ 2011	404 (3.5)	37 ▲	14 ▲		
2007	367 (3.5)		−23 ▼		
2003	390 (3.1)				
Romania					
2011	458 (4.0)	−3	−17 ▼	−14 ▼	−16 ▼
2007	461 (4.1)		−14 ▼	−11	−12 ▼
2003	475 (4.8)			3	2
1999	472 (5.8)				−1
1995	474 (4.6)				
Russian Federation					
2 2011	539 (3.6)	27 ▲	31 ▲	13	15 ▲
2007	512 (4.1)		4	−14 ▼	−12
2003	508 (3.7)			−18 ▼	−16 ▼
1999	526 (5.9)				2
2 1995	524 (5.3)				
Singapore					
2 2011	611 (3.8)	18 ▲	6	7	2
2007	593 (3.8)		−13 ▼	−12	−16 ▼
2003	605 (3.6)			1	−3
1999	604 (6.3)				−4
1995	609 (4.0)				
Slovenia					
2011	505 (2.2)	3	12 ▲		10 ▲
2007	501 (2.1)		9 ▲		7 ▲
2003	493 (2.2)				−2
1995	494 (2.9)				
Sweden					
2011	484 (1.9)	−7 ▼	−15 ▼		−55 ▼
2007	491 (2.3)		−8 ▼		−48 ▼
2003	499 (2.6)				−41 ▼
1995	540 (4.3)				
Syrian Arab Republic					
Ψ 2011	380 (4.5)	−15 ▼			
2007	395 (3.8)				
Thailand					
2011	427 (4.3)	−14 ▼		−40 ▼	
2007	441 (5.0)			−26 ▼	
1999	467 (5.1)				
Tunisia					
2011	425 (2.8)	4	14 ▲	−23 ▼	
2007	420 (2.4)		10 ▲	−28 ▼	
2003	410 (2.2)			−38 ▼	
1999	448 (2.4)				
Ukraine					
2011	479 (3.9)	17 ▲			
2007	462 (3.6)				

Mathematics Achievement Distribution



▲ More recent year significantly higher

▼ More recent year significantly lower



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

TIMSS & PIRLS International Study Center
Lynch School of Education, Boston College

Exhibit 1.6: Trends in Mathematics Achievement (Continued)

TIMSS 2011 Mathematics 8th Grade

Instructions: Read across the row to determine if the performance in the row year is significantly higher (▲) or significantly lower (▼) than the performance in the column year.

Country	Average Scale Score	Differences Between Years 2007	2003	1999	1995	Mathematics Achievement Distribution
United States						
2 2011	509 (2.6)	1	5	8	17 ▲	
2 † 2007	508 (2.8)		4	7	16 ▲	
‡ 2003	504 (3.3)			3	12 ▲	
1999	502 (4.0)				9	
† 1995	492 (4.7)					
Benchmarking Participants						
Alberta, Canada						
2 2011	505 (2.6)			−26 ▼	−22 ▼	
1999	531 (6.3)				4	
1995	527 (3.9)					
Ontario, Canada						
2 2011	512 (2.5)	−6	−9 ▼	−5	11 ▲	
2 2007	517 (3.5)		−4	1	17 ▲	
2 2003	521 (3.1)			4	20 ▲	
1999	517 (3.0)				16 ▲	
1995	501 (2.9)					
Quebec, Canada						
2011	532 (2.3)	3	−12 ▼	−34 ▼	−25 ▼	
3 2007	528 (3.5)		−15 ▼	−38 ▼	−28 ▼	
2003	543 (3.0)			−23 ▼	−13 ▼	
1999	566 (5.3)				9	
1995	556 (5.9)					
Dubai, UAE						
2011	478 (2.1)	17 ▲				
◆ ‡ 2007	461 (2.4)					
Connecticut, US						
1 2011	518 (4.8)			5		
1999	512 (9.1)					
Indiana, US						
1 2 2011	522 (5.1)		13	7		
2 2003	508 (5.2)			−6		
2 † 1999	515 (7.2)					
Massachusetts, US						
1 2 2011	561 (5.3)	13		47 ▲		
2 2007	547 (4.6)			34 ▲		
1999	513 (5.9)					
Minnesota, US						
1 2011	545 (4.6)	12			26 ▲	
2 † 2007	532 (4.4)				14	
† 1995	518 (7.3)					
North Carolina, US						
1 3 2011	537 (6.8)			42 ▲		
1999	495 (7.0)					

100 200 300 400 500 600 700 800

▲ More recent year significantly higher

▼ More recent year significantly lower

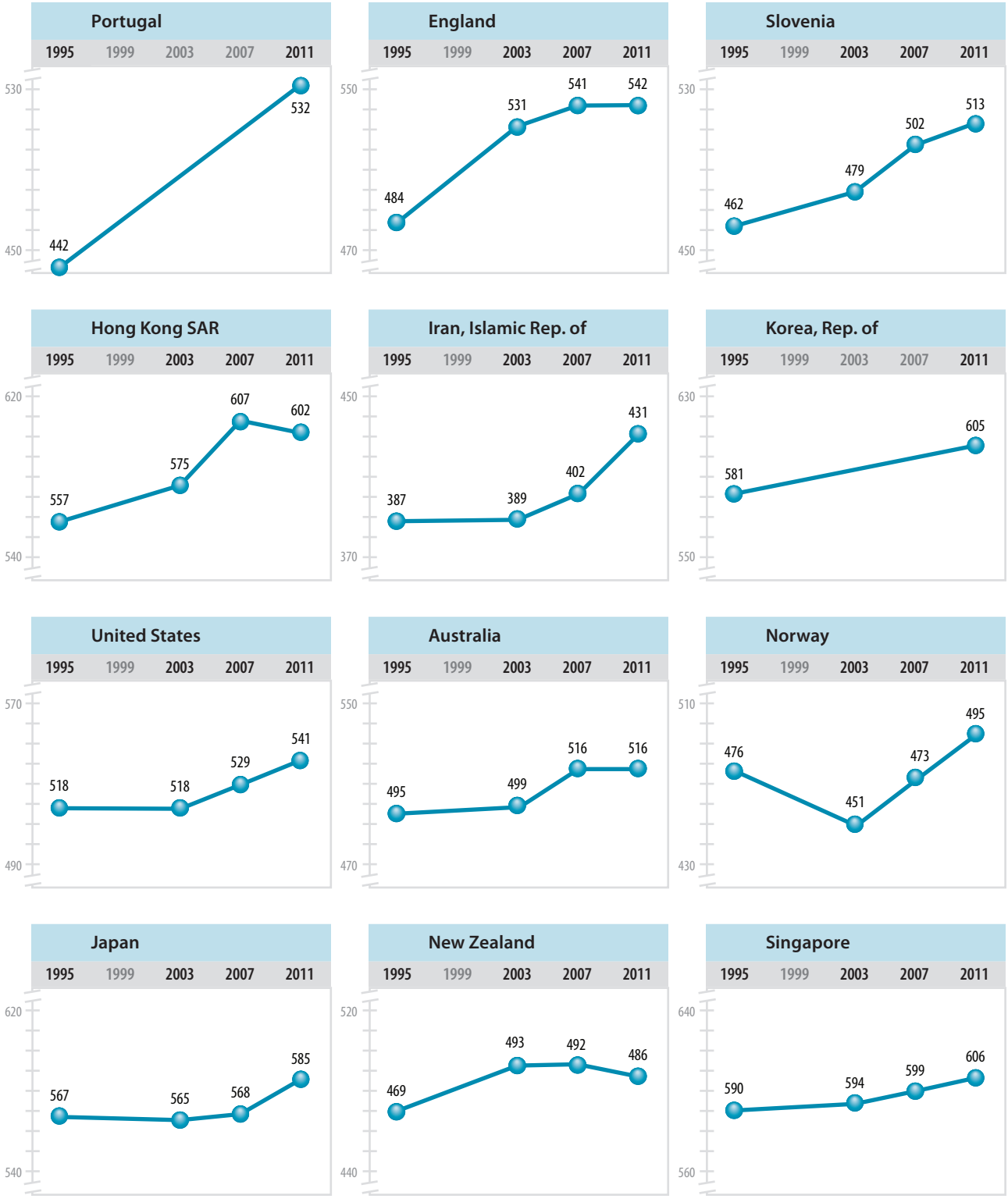
Percentiles of Performance
5th 25th 75th 95th
95% Confidence Interval for Average (±2SE)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 1.7: Trends in Mathematics Achievement – 1995 Through 2011*

TIMSS 2011 Mathematics 4th Grade

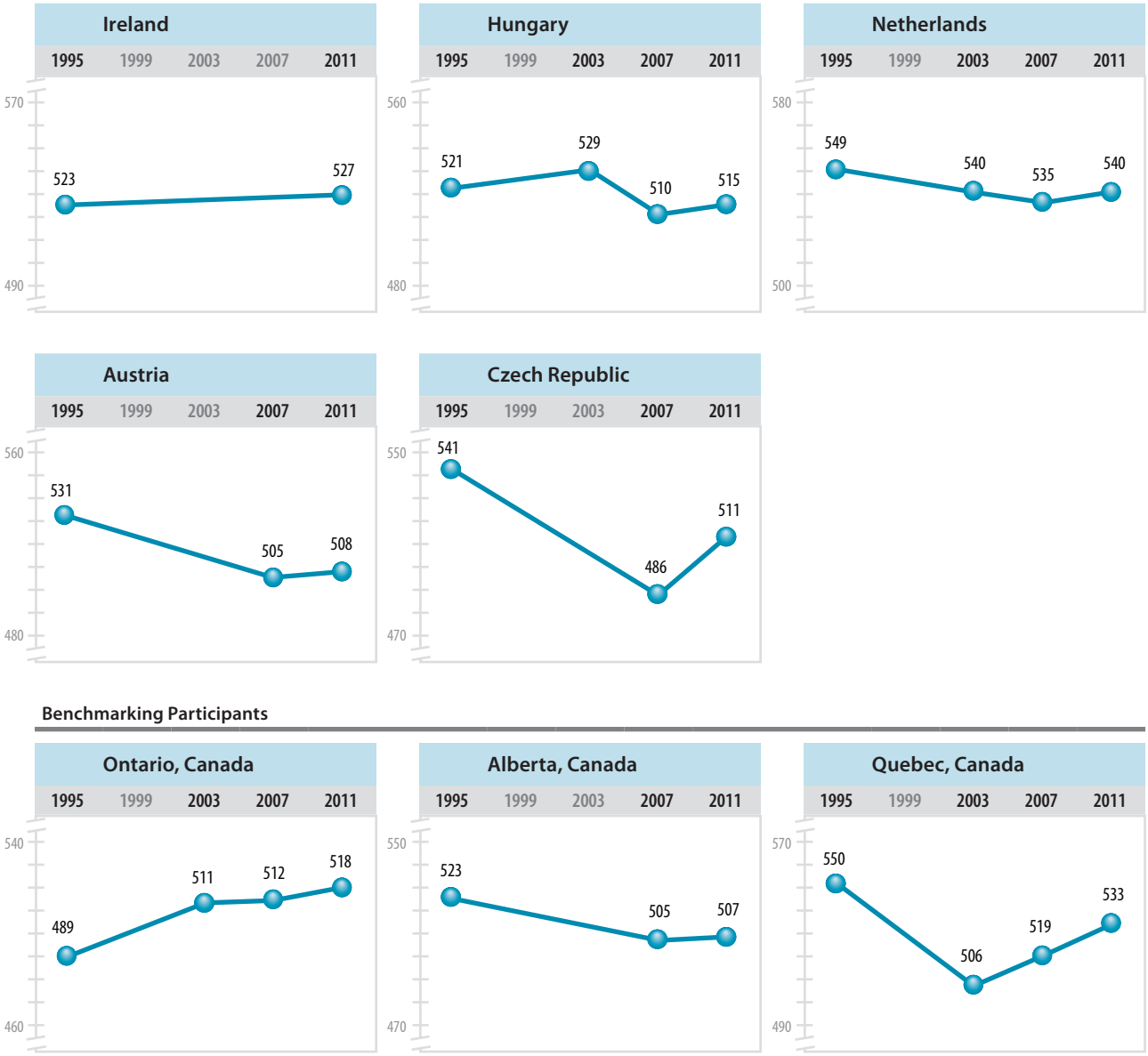
Includes only 2011 participants with comparable long term trend data beginning in 1995, ordered by most to least improvement in average achievement. Exhibit 1.5 provides details including statistical significance.



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

* No fourth-grade assessment in 1999.
Scale interval is 10 points for each country, but the part of the scale shown differs according to each country's average achievement.

Exhibit 1.7: Trends in Mathematics Achievement – 1995 Through 2011* (Continued)

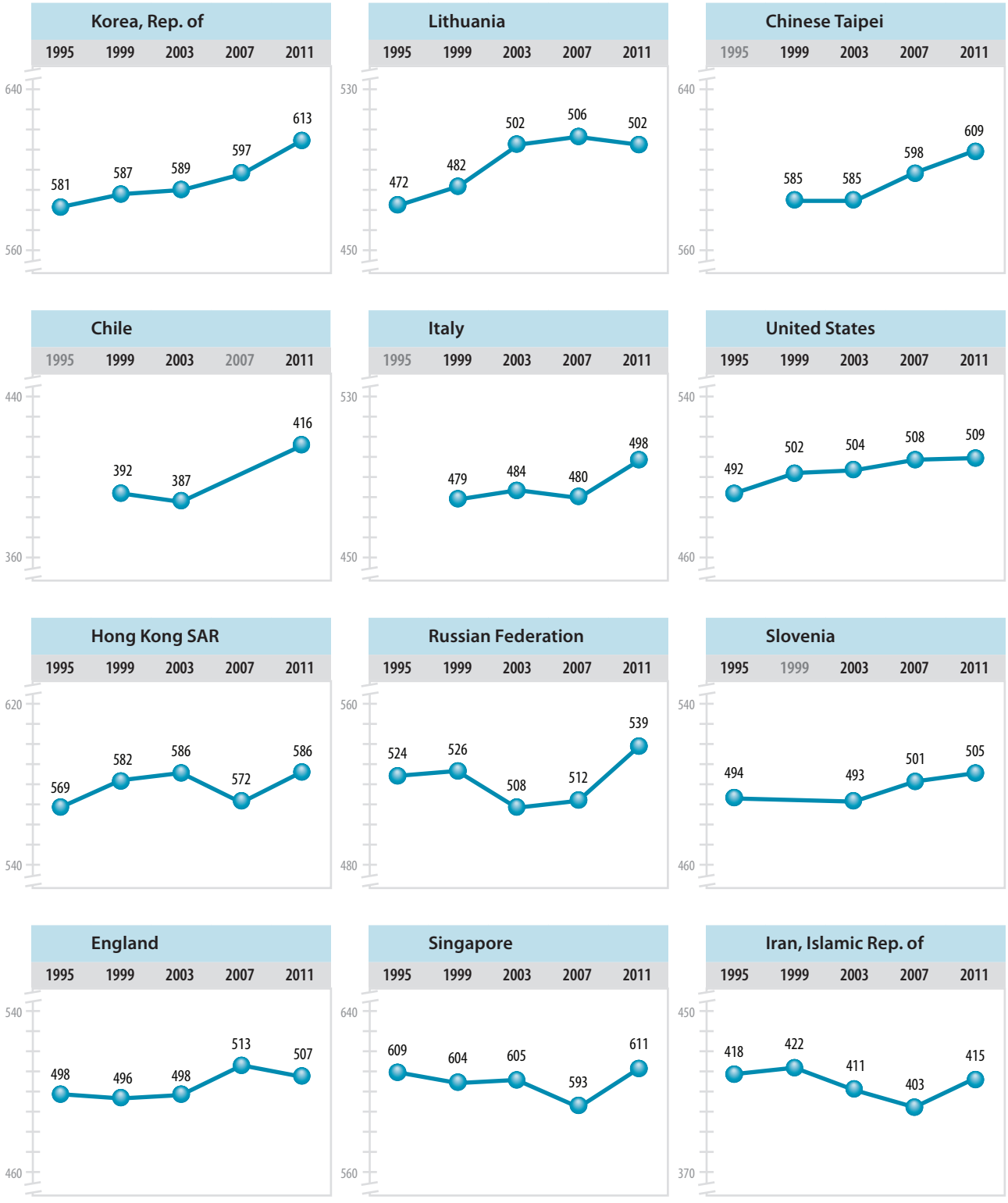


SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 1.8: Trends in Mathematics Achievement – 1995 Through 2011

TIMSS 2011 8th Grade Mathematics

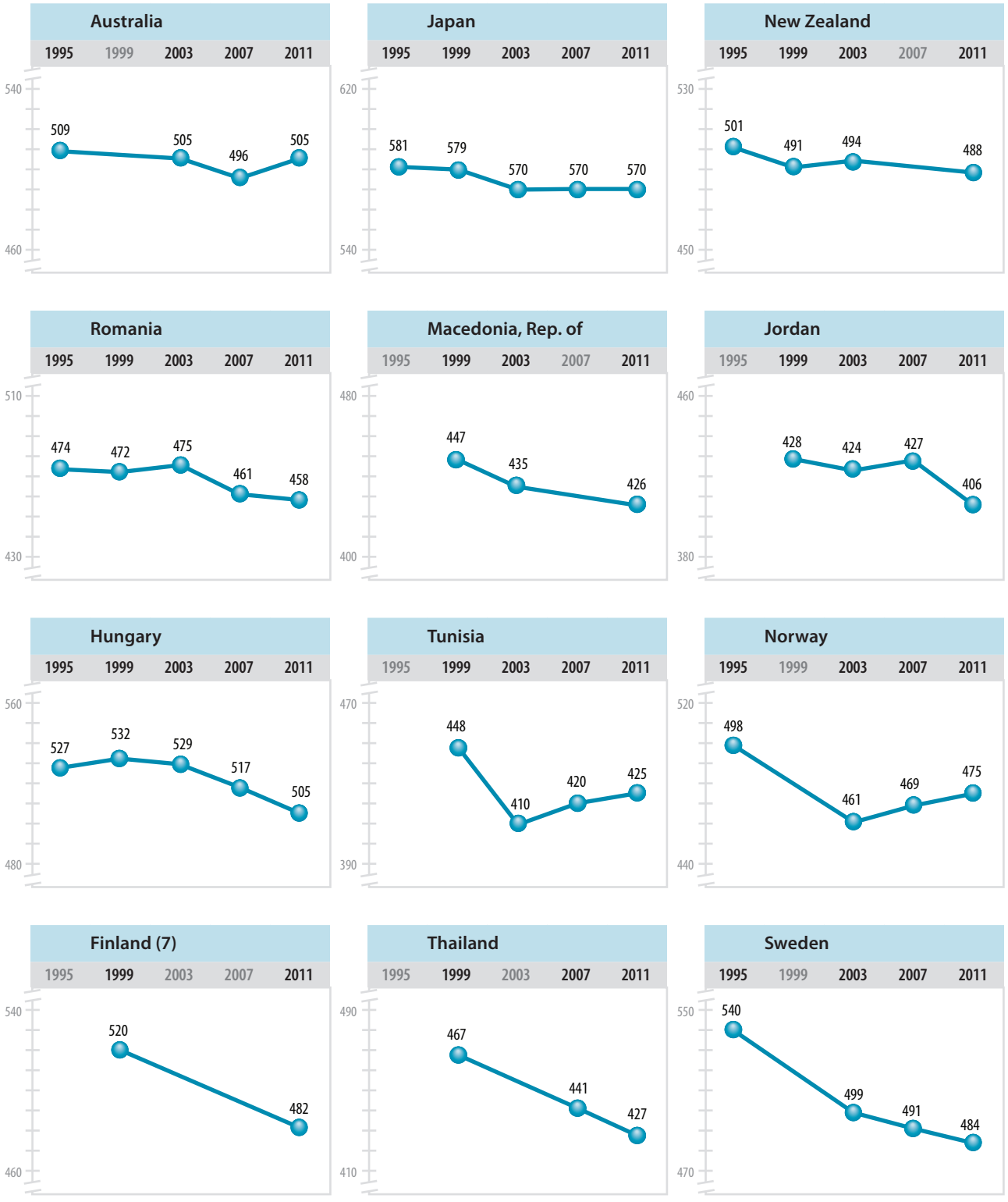
Includes only 2011 participants with comparable long term trend data beginning in either 1995 or 1999, ordered by most to least improvement in average achievement. Exhibit 1.6 provides details including statistical significance.



Scale interval is 10 points for each country, but the part of the scale shown differs according to each country's average achievement.

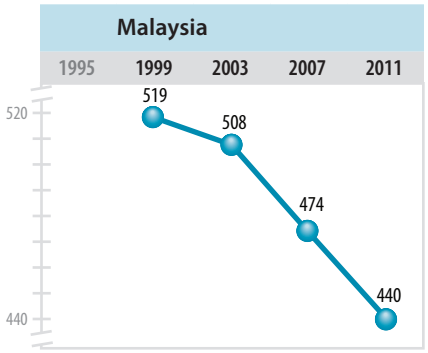
SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 1.8: Trends in Mathematics Achievement – 1995 Through 2011 (Continued)

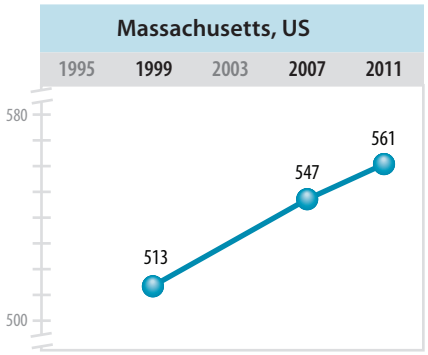


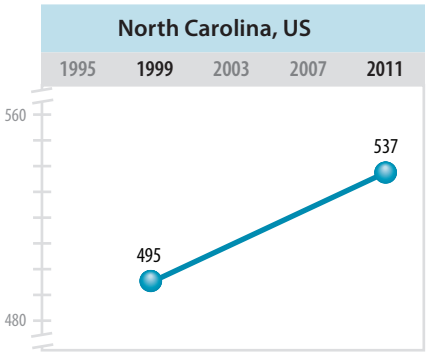
SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

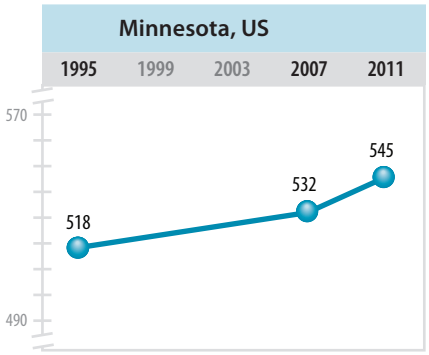
Exhibit 1.8: Trends in Mathematics Achievement – 1995 Through 2011 (Continued)

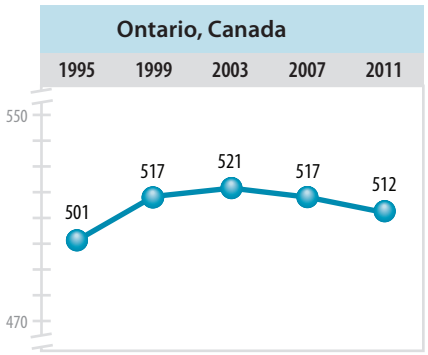


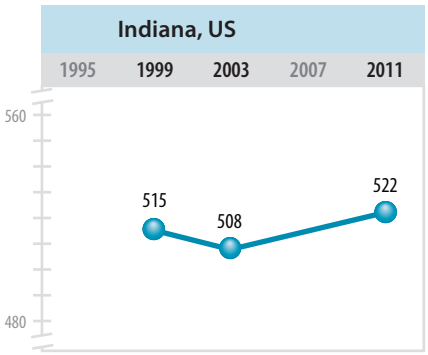
Benchmarking Participants

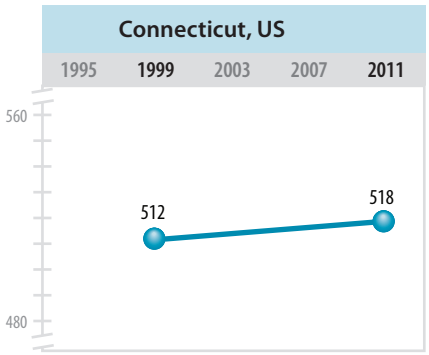


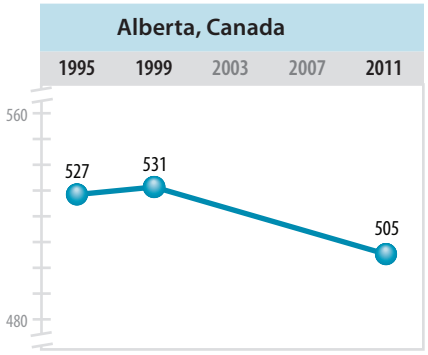


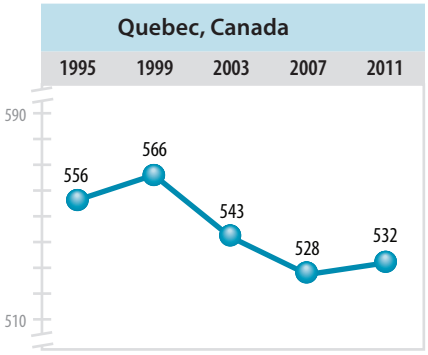












SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Trends Across Grades: Fourth to Eighth Grade Cohort Analysis

Because TIMSS is conducted on a four-year cycle, the cohort of students that was assessed in the fourth grade in 2007 had reached the eighth grade by 2011, and thus was assessed at the eighth grade in 2011. This enables the 17 countries and three benchmarking participants that assessed both grades in both assessment years to examine how their performance relative to each other changed as the fourth grade students of 2007 became the eighth grade students of 2011. The results are presented in Exhibit 1.9, which shows average mathematics achievement as a difference from the TIMSS scale centerpoint (500) for the fourth grade students in 2007 (upper-left panel) and in 2011 (upper-right panel). The exhibit also shows achievement for the eighth grade students in 2007 (lower-left panel) and in 2011 (lower-right panel). The trends for the fourth and eighth grades (indicated by the gray horizontal arrows), however, were presented more fully in Exhibits 1.5 and 1.6, respectively. The purpose of Exhibit 1.9 is to provide information about relative progress across grades as the cohort of students assessed at the fourth grade in 2007 moved to the eighth grade four years later in 2011. That is, to compare relative performance at the fourth grade in 2007 (upper-left panel) to relative performance at the eighth grade in 2011 (lower-right panel) as indicated by the darker arrow pointing diagonally downward.

Six countries, including Hong Kong SAR, Singapore, Chinese Taipei, Japan, the Russian Federation, and the United States as well as the two Canadian provinces of Ontario and Québec performed above the scale centerpoint at the fourth grade in 2007 and again at the eighth grade in 2011 (although not in the same order of average achievement). Norway, Georgia, Iran, Tunisia and Dubai, UAE also retained the same relative positions, performing below the scale centerpoint in the fourth grade in 2007 and again at the eighth grade in 2011. However, six countries had a relative decline in achievement from fourth to eighth grades, with England, Lithuania, Australia, Hungary, and Italy

Exhibit 1.9: Relative Achievement of 2007 Fourth Grade Cohort as Eighth Grade Students in 2011

TIMSS 2011 Mathematics 4th & 8th Grades

2007 - Fourth Grade

Country	Achievement Difference from TIMSS Scale Centerpoint (500)	
Hong Kong SAR	107 (3.6)	▲
Singapore	99 (3.7)	▲
Chinese Taipei	76 (1.7)	▲
Japan	68 (2.1)	▲
Russian Federation	44 (4.9)	▲
England	41 (2.9)	▲
Lithuania	30 (2.4)	▲
United States	29 (2.4)	▲
Australia	16 (3.5)	▲
Hungary	10 (3.5)	▲
Italy	7 (3.1)	▲
Sweden	3 (2.5)	
Slovenia	2 (1.8)	
Norway	–27 (2.5)	▼
Georgia	–62 (4.2)	▼
Iran, Islamic Rep. of	–98 (4.1)	▼
Tunisia	–173 (4.5)	▼
Benchmarking Participants		
Quebec, Canada	19 (3.0)	▲
Ontario, Canada	12 (3.1)	▲
Dubai, UAE	–56 (2.1)	▼

2011 - Fourth Grade

Country	Achievement Difference from TIMSS Scale Centerpoint (500)	
Singapore	106 (3.2)	▲
Hong Kong SAR	102 (3.4)	▲
Chinese Taipei	91 (2.0)	▲
Japan	85 (1.7)	▲
England	42 (3.5)	▲
Russian Federation	42 (3.7)	▲
United States	41 (1.8)	▲
Lithuania	34 (2.4)	▲
Australia	16 (2.9)	▲
Hungary	15 (3.4)	▲
Slovenia	13 (2.2)	▲
Italy	8 (2.6)	▲
Sweden	4 (2.0)	
Norway	–5 (2.8)	
Georgia	–50 (3.7)	▼
Iran, Islamic Rep. of	–69 (3.5)	▼
Tunisia	–141 (3.9)	▼
Benchmarking Participants		
Quebec, Canada	33 (2.4)	▲
Ontario, Canada	18 (3.1)	▲
Dubai, UAE	–32 (1.6)	▼

2007 - Eighth Grade

Country	Achievement Difference from TIMSS Scale Centerpoint (500)	
Chinese Taipei	98 (4.5)	▲
Singapore	93 (3.8)	▲
Hong Kong SAR	72 (5.8)	▲
Japan	70 (2.4)	▲
Hungary	17 (3.5)	▲
England	13 (4.8)	▲
Russian Federation	12 (4.1)	▲
United States	8 (2.8)	▲
Lithuania	6 (2.3)	▲
Slovenia	1 (2.1)	
Australia	–4 (3.9)	
Sweden	–9 (2.3)	▼
Italy	–20 (3.0)	▼
Norway	–31 (2.0)	▼
Tunisia	–80 (2.4)	▼
Georgia	–90 (5.9)	▼
Iran, Islamic Rep. of	–97 (4.1)	▼
Benchmarking Participants		
Quebec, Canada	28 (3.5)	▲
Ontario, Canada	17 (3.5)	▲
Dubai, UAE	–39 (2.4)	▼

2011 - Eighth Grade

Country	Achievement Difference from TIMSS Scale Centerpoint (500)	
Singapore	111 (3.8)	▲
Chinese Taipei	109 (3.2)	▲
Hong Kong SAR	86 (3.8)	▲
Japan	70 (2.6)	▲
Russian Federation	39 (3.6)	▲
United States	9 (2.6)	▲
England	7 (5.5)	
Hungary	5 (3.5)	
Australia	5 (5.1)	
Slovenia	5 (2.2)	▲
Lithuania	2 (2.5)	
Italy	–2 (2.4)	
Sweden	–16 (1.9)	▼
Norway	–25 (2.4)	▼
Georgia	–69 (3.8)	▼
Tunisia	–75 (2.8)	▼
Iran, Islamic Rep. of	–85 (4.3)	▼
Benchmarking Participants		
Quebec, Canada	32 (2.3)	▲
Ontario, Canada	12 (2.5)	▲
Dubai, UAE	–22 (2.1)	▼

▲ Country average significantly higher than the centerpoint of the TIMSS scale

▼ Country average significantly lower than the centerpoint of the TIMSS scale

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

moving from above the centerpoint at the fourth grade in 2007 to close to the centerpoint at the eighth grade in 2011, and Sweden moving from near the centerpoint to below the centerpoint in 2011. In comparison, Slovenia was the only country to show relative improvement, moving from about the centerpoint at the fourth grade in 2007 to just above it at the eighth grade in 2011.

Gender Differences in Mathematics Achievement

Previous TIMSS assessments have shown gender differences in mathematics achievement to be small on average at the fourth grade and somewhat larger in favor of girls at the eighth grade, although the situation varies considerably from country to country.

Exhibit 1.10 presents the TIMSS 2011 fourth grade results for gender differences in mathematics achievement. For the TIMSS 2011 countries at fourth grade, at sixth grade, and the benchmarking participants, it shows girls' average achievement, boys' average achievement, and the difference between the two averages. The bar graph shows the size of the achievement difference and whether that difference is statistically significant (as indicated by a darkened bar). For countries participating at the fourth grade, international averages also are shown (averages across the mean scores for girls in each of the countries and the mean scores for boys in each of the countries). Exhibit 1.11 presents corresponding results for the TIMSS 2011 eighth grade assessment.

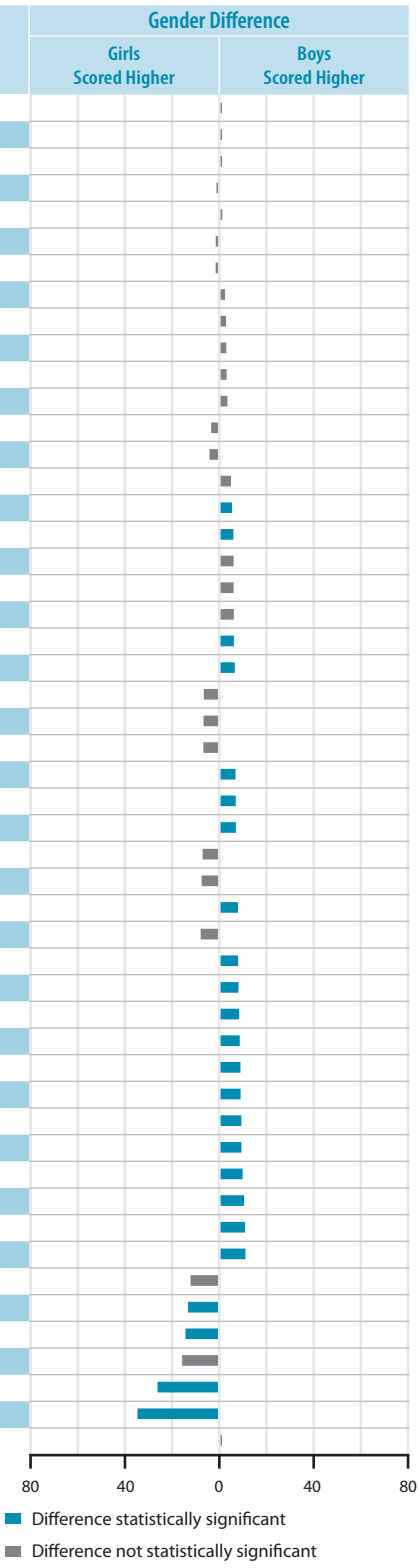
In each section of Exhibit 1.10, participants are shown in order by the increasing size of the difference between girls and boys in average mathematics achievement. Averaging mathematics achievement across countries, it is clear that there was little achievement difference between girls and boys (International Average: 490 vs. 491). Of the 50 countries at the fourth grade, 26 had no significant gender difference in mathematics achievement. Of the 24 remaining countries, 20 had small differences favoring boys, and four had relatively larger differences favoring girls (Qatar, Thailand, Oman, and Kuwait). At the sixth grade, there was a significant achievement difference favoring girls in Botswana and favoring boys in Honduras. Boys also had higher average mathematics achievement than girls in each of the benchmarking entities, except Dubai where there was no difference and Abu Dhabi where girls had higher achievement than boys.

As shown in Exhibit 1.11, gender differences in mathematics achievement at the eighth grade were larger, on average, than at fourth grade, with the difference favoring girls (International Average: 469 vs. 465). Similar to the

Exhibit 1.10: Average Mathematics Achievement by Gender

TIMSS 2011 Mathematics 4th Grade

Country	Girls		Boys		Difference (Absolute Value)
	Percent of Students	Average Scale Score	Percent of Students	Average Scale Score	
Iran, Islamic Rep. of	49 (2.9)	431 (5.2)	51 (2.9)	431 (5.4)	0 (8.0)
New Zealand	49 (0.8)	486 (3.3)	51 (0.8)	486 (2.8)	0 (3.1)
† Northern Ireland	49 (1.3)	562 (3.3)	51 (1.3)	563 (3.6)	0 (3.8)
Russian Federation	49 (1.0)	543 (3.7)	51 (1.0)	542 (4.1)	1 (2.4)
1 2 Lithuania	48 (0.8)	533 (2.6)	52 (0.8)	534 (2.9)	1 (2.6)
Chinese Taipei	47 (0.6)	592 (2.5)	53 (0.6)	590 (2.4)	2 (2.8)
Turkey	48 (0.6)	470 (5.2)	52 (0.6)	469 (4.8)	2 (3.8)
Hungary	49 (1.0)	514 (3.6)	51 (1.0)	517 (3.9)	2 (3.2)
Romania	48 (0.9)	481 (6.7)	52 (0.9)	484 (5.9)	3 (4.5)
Japan	49 (0.5)	584 (2.0)	51 (0.5)	587 (2.5)	3 (3.0)
England	48 (1.0)	541 (4.2)	52 (1.0)	544 (3.5)	3 (3.4)
Ireland	49 (2.3)	526 (3.7)	51 (2.3)	529 (3.3)	3 (4.6)
Armenia	47 (0.8)	454 (4.1)	53 (0.8)	451 (3.6)	3 (3.0)
2 Singapore	49 (0.6)	608 (3.6)	51 (0.6)	604 (3.5)	4 (3.0)
Sweden	49 (1.0)	501 (2.5)	51 (1.0)	506 (2.4)	5 (2.7)
2 Kazakhstan	48 (0.8)	498 (4.4)	52 (0.8)	504 (4.8)	5 (2.6)
2 Denmark	51 (0.7)	534 (2.9)	49 (0.7)	540 (2.9)	6 (2.8)
Australia	49 (1.0)	513 (3.3)	51 (1.0)	519 (3.6)	6 (3.8)
Portugal	49 (1.1)	529 (4.1)	51 (1.1)	535 (3.4)	6 (3.2)
2 Serbia	48 (0.9)	513 (3.8)	52 (0.9)	519 (3.5)	6 (4.1)
2 Hong Kong SAR	46 (1.2)	598 (3.2)	54 (1.2)	604 (3.9)	6 (2.3)
Korea, Rep. of	48 (0.4)	601 (2.1)	52 (0.4)	608 (2.2)	7 (2.0)
2 Azerbaijan	47 (0.8)	466 (6.4)	53 (0.8)	460 (5.9)	7 (3.9)
Ж Morocco	48 (0.8)	338 (4.6)	52 (0.8)	331 (4.3)	7 (3.9)
Ψ Tunisia	47 (0.8)	363 (4.5)	53 (0.8)	356 (4.4)	7 (4.4)
Malta	49 (0.5)	492 (1.6)	51 (0.5)	499 (2.1)	7 (2.5)
‡ Norway	51 (1.1)	492 (2.8)	49 (1.1)	499 (3.5)	7 (2.8)
Finland	49 (0.8)	542 (2.5)	51 (0.8)	549 (2.9)	7 (2.8)
1 Georgia	48 (0.9)	454 (3.2)	52 (0.9)	447 (4.9)	7 (3.9)
Bahrain	50 (1.6)	440 (4.5)	50 (1.6)	432 (4.0)	7 (5.5)
† Netherlands	52 (1.0)	536 (2.1)	48 (1.0)	544 (2.1)	8 (2.4)
United Arab Emirates	50 (1.6)	438 (2.8)	50 (1.6)	430 (3.5)	8 (5.0)
Belgium (Flemish)	50 (0.9)	545 (2.2)	50 (0.9)	553 (2.4)	8 (2.5)
Slovak Republic	49 (0.9)	503 (4.0)	51 (0.9)	511 (3.9)	8 (2.6)
Germany	49 (0.8)	523 (2.7)	51 (0.8)	532 (2.6)	8 (2.7)
2 United States	51 (0.5)	536 (2.1)	49 (0.5)	545 (1.9)	9 (1.7)
Italy	50 (0.7)	503 (3.1)	50 (0.7)	512 (2.9)	9 (3.0)
Poland	48 (0.9)	476 (2.4)	52 (0.9)	486 (2.5)	9 (2.5)
Austria	49 (1.2)	504 (2.7)	51 (1.2)	513 (3.3)	9 (2.8)
Chile	51 (1.4)	457 (2.7)	49 (1.4)	466 (2.8)	9 (3.3)
Slovenia	48 (0.8)	508 (2.2)	52 (0.8)	518 (3.1)	10 (3.2)
2 Croatia	50 (0.8)	485 (2.4)	50 (0.8)	495 (2.4)	10 (2.8)
Czech Republic	48 (1.2)	505 (2.8)	52 (1.2)	516 (2.7)	11 (2.7)
Spain	49 (0.8)	477 (3.1)	51 (0.8)	488 (3.4)	11 (3.0)
Ж Yemen	40 (2.8)	255 (7.0)	60 (2.8)	243 (7.0)	12 (7.6)
2 Qatar	47 (3.4)	420 (4.7)	53 (3.4)	407 (4.2)	13 (5.6)
Thailand	49 (0.9)	465 (4.8)	51 (0.9)	451 (5.6)	14 (4.4)
Saudi Arabia	52 (1.5)	418 (4.6)	48 (1.5)	402 (10.0)	16 (11.2)
Ψ Oman	49 (0.7)	398 (3.2)	51 (0.7)	372 (3.4)	26 (3.3)
1 Ж Kuwait	54 (1.6)	358 (3.6)	46 (1.6)	323 (5.8)	35 (6.8)
International Avg.	49 (0.2)	490 (0.5)	51 (0.2)	491 (0.6)	



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Ж Average achievement not reliably measured because the percentage of students with achievement too low for estimation exceeds 25%.

Ψ Reservations about reliability of average achievement because the percentage of students with achievement too low for estimation does not exceed 25% but exceeds 15%.

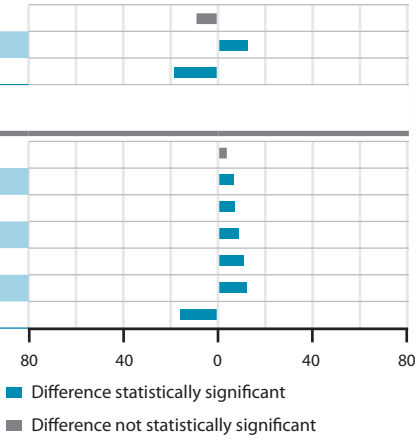
See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Exhibit 1.10: Average Mathematics Achievement by Gender (Continued)

TIMSS 2011 Mathematics 4th Grade

Country	Girls		Boys		Difference (Absolute Value)	Gender Difference	
	Percent of Students	Average Scale Score	Percent of Students	Average Scale Score		Girls Scored Higher	Boys Scored Higher
Sixth Grade Participants							
✳ Yemen	42 (2.5)	354 (7.5)	58 (2.5)	345 (6.4)	9 (7.8)		
Ψ Honduras	51 (1.2)	390 (5.9)	49 (1.2)	403 (5.8)	12 (3.7)		
Botswana	52 (0.8)	428 (4.0)	48 (0.8)	410 (4.2)	18 (3.4)		
Benchmarking Participants							
Dubai, UAE	47 (2.4)	466 (3.5)	53 (2.4)	470 (3.9)	4 (6.7)		
Ontario, Canada	49 (0.8)	515 (3.3)	51 (0.8)	521 (3.4)	6 (2.6)		
1 3 Florida, US	51 (0.8)	542 (2.8)	49 (0.8)	549 (3.9)	7 (3.3)		
2 Alberta, Canada	48 (0.9)	502 (3.1)	52 (0.9)	511 (2.7)	9 (3.1)		
Quebec, Canada	50 (1.0)	527 (2.8)	50 (1.0)	538 (2.7)	11 (2.6)		
1 2 North Carolina, US	51 (1.3)	548 (4.0)	49 (1.3)	560 (4.9)	12 (3.2)		
Abu Dhabi, UAE	50 (2.9)	425 (5.0)	50 (2.9)	409 (6.7)	16 (7.9)		

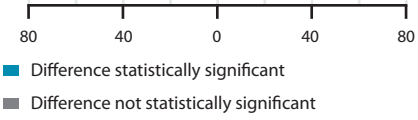


SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 1.11: Average Mathematics Achievement by Gender

TIMSS 2011 Mathematics 8th Grade

Country	Girls		Boys		Difference (Absolute Value)	Gender Difference	
	Percent of Students	Average Scale Score	Percent of Students	Average Scale Score		Girls Scored Higher	Boys Scored Higher
Ж Morocco	47 (0.8)	371 (2.3)	53 (0.8)	371 (2.7)	0 (3.2)		
2 Russian Federation	49 (0.9)	539 (3.8)	51 (0.9)	539 (3.9)	1 (2.9)		
Kazakhstan	49 (0.8)	486 (4.1)	51 (0.8)	488 (4.5)	2 (3.3)		
Norway	49 (0.7)	476 (2.9)	51 (0.7)	473 (2.9)	3 (3.1)		
‡ England	48 (2.0)	508 (5.7)	52 (2.0)	505 (6.6)	3 (5.6)		
1 Georgia	47 (0.9)	430 (4.1)	53 (0.9)	432 (4.4)	3 (4.0)		
Ukraine	50 (1.0)	478 (4.0)	50 (1.0)	481 (4.9)	3 (4.4)		
2 United States	51 (0.6)	508 (2.9)	49 (0.6)	511 (2.8)	4 (2.2)		
Sweden	48 (0.9)	486 (2.1)	52 (0.9)	482 (2.4)	4 (2.4)		
Finland	48 (1.1)	516 (2.7)	52 (1.1)	512 (2.7)	4 (2.3)		
Slovenia	49 (0.9)	502 (2.4)	51 (0.9)	507 (2.8)	5 (2.8)		
Hungary	49 (1.1)	502 (3.9)	51 (1.1)	508 (3.9)	6 (3.5)		
Hong Kong SAR	49 (1.6)	588 (5.0)	51 (1.6)	583 (4.3)	6 (5.5)		
Chinese Taipei	48 (1.0)	613 (3.7)	52 (1.0)	606 (3.8)	6 (4.1)		
Korea, Rep. of	52 (2.5)	610 (3.5)	48 (2.5)	616 (3.1)	6 (3.1)		
Ψ Iran, Islamic Rep. of	46 (2.3)	411 (5.9)	54 (2.3)	418 (5.9)	7 (8.1)		
Ψ Macedonia, Rep. of	49 (0.9)	430 (5.8)	51 (0.9)	423 (5.6)	7 (4.7)		
Japan	49 (1.1)	566 (3.1)	51 (1.1)	574 (3.5)	8 (4.1)		
3 Israel	50 (1.6)	520 (3.9)	50 (1.6)	512 (5.2)	8 (4.4)		
2 Singapore	49 (0.7)	615 (3.7)	51 (0.7)	607 (4.5)	9 (3.5)		
Turkey	49 (0.7)	457 (3.8)	51 (0.7)	448 (4.7)	9 (3.5)		
Australia	50 (1.6)	500 (4.7)	50 (1.6)	509 (7.3)	9 (6.9)		
1 Lithuania	49 (0.7)	507 (2.6)	51 (0.7)	498 (3.2)	9 (3.0)		
Armenia	49 (0.8)	472 (3.1)	51 (0.8)	462 (3.2)	10 (3.1)		
Ψ Syrian Arab Republic	50 (1.7)	375 (5.3)	50 (1.7)	385 (5.3)	11 (5.7)		
Italy	49 (0.9)	493 (2.9)	51 (0.9)	504 (2.8)	11 (2.9)		
Romania	48 (0.9)	464 (4.6)	52 (0.9)	453 (4.2)	11 (3.6)		
Ψ Qatar	50 (3.3)	415 (5.8)	50 (3.3)	404 (5.5)	11 (9.5)		
Lebanon	55 (1.9)	444 (4.2)	45 (1.9)	456 (4.7)	12 (4.7)		
Ψ Indonesia	50 (1.2)	392 (4.9)	50 (1.2)	379 (4.5)	13 (4.0)		
Chile	53 (1.5)	409 (3.2)	47 (1.5)	424 (3.0)	14 (3.6)		
Ψ Saudi Arabia	48 (1.2)	401 (4.1)	52 (1.2)	387 (8.0)	15 (8.9)		
Tunisia	52 (0.7)	417 (3.1)	48 (0.7)	433 (3.1)	17 (2.5)		
United Arab Emirates	50 (1.7)	464 (2.7)	50 (1.7)	447 (3.1)	17 (4.2)		
Thailand	55 (1.6)	435 (4.2)	45 (1.6)	417 (5.3)	18 (4.4)		
New Zealand	47 (2.0)	478 (5.5)	53 (2.0)	496 (6.2)	18 (4.7)		
Malaysia	51 (1.2)	449 (5.2)	49 (1.2)	430 (6.2)	19 (4.4)		
Ψ Palestinian Nat'l Auth.	52 (1.7)	415 (4.2)	48 (1.7)	392 (5.6)	23 (7.0)		
Ж Ghana	47 (0.8)	318 (4.8)	53 (0.8)	342 (4.3)	23 (2.9)		
Ψ Jordan	49 (1.7)	420 (4.3)	51 (1.7)	392 (5.9)	28 (7.4)		
Ψ Bahrain	50 (0.8)	431 (2.5)	50 (0.8)	388 (3.1)	43 (4.0)		
Ψ Oman	51 (2.1)	397 (3.1)	49 (2.1)	334 (3.8)	63 (4.6)		
International Avg.	50 (0.2)	469 (0.6)	50 (0.2)	465 (0.7)			



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Ж Average achievement not reliably measured because the percentage of students with achievement too low for estimation exceeds 25%.

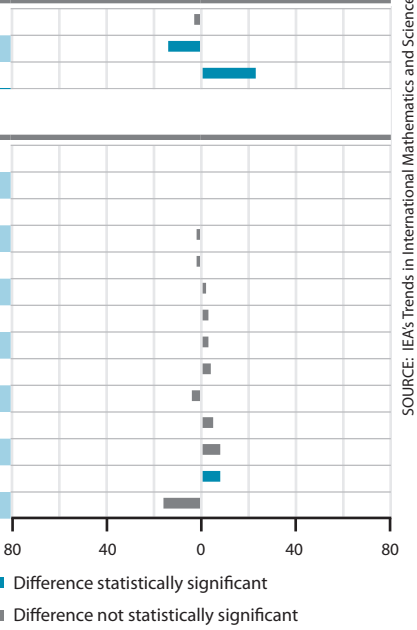
Ψ Reservations about reliability of average achievement because the percentage of students with achievement too low for estimation does not exceed 25% but exceeds 15%.

See Appendix C.3 for target population coverage notes 1, 2, and 3. See Appendix C.9 for sampling guidelines and sampling participation notes †, ‡, and ‡.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Exhibit 1.11: Average Mathematics Achievement by Gender (Continued)

Country	Girls		Boys		Difference (Absolute Value)	Gender Difference	
	Percent of Students	Average Scale Score	Percent of Students	Average Scale Score		Girls Scored Higher	Boys Scored Higher
Ninth Grade Participants							
✳ South Africa	48 (1.0)	354 (3.0)	52 (1.0)	350 (3.4)	3 (4.0)		
Ψ Botswana	51 (0.6)	403 (2.9)	49 (0.6)	390 (3.0)	14 (3.1)		
2 ✳ Honduras	55 (1.0)	328 (4.1)	45 (1.0)	351 (4.1)	23 (3.5)		
Benchmarking Participants							
2 Ontario, Canada	49 (0.9)	512 (2.7)	51 (0.9)	512 (3.1)	0 (3.1)		
Quebec, Canada	51 (1.4)	531 (2.9)	49 (1.4)	532 (2.5)	0 (2.7)		
1 Minnesota, US	52 (1.5)	545 (4.9)	48 (1.5)	545 (5.1)	0 (3.9)		
1 Alabama, US	51 (1.6)	467 (6.3)	49 (1.6)	465 (6.2)	2 (3.9)		
Abu Dhabi, UAE	47 (2.7)	450 (3.9)	53 (2.7)	448 (5.7)	2 (6.4)		
2 Alberta, Canada	50 (0.9)	504 (3.3)	50 (0.9)	506 (2.7)	2 (3.0)		
1 3 North Carolina, US	52 (1.0)	535 (6.2)	48 (1.0)	539 (8.3)	3 (5.1)		
1 2 California, US	49 (1.1)	491 (5.6)	51 (1.1)	494 (5.0)	3 (4.1)		
1 Colorado, US	51 (1.5)	516 (5.4)	49 (1.5)	520 (5.0)	4 (3.4)		
1 2 Connecticut, US	49 (1.0)	520 (5.2)	51 (1.0)	516 (5.4)	4 (4.5)		
1 2 Massachusetts, US	50 (1.0)	558 (6.0)	50 (1.0)	563 (5.5)	5 (4.5)		
1 2 Florida, US	49 (1.9)	509 (6.6)	51 (1.9)	517 (7.3)	8 (5.5)		
1 2 Indiana, US	52 (1.1)	518 (5.1)	48 (1.1)	526 (5.9)	8 (4.0)		
Dubai, UAE	48 (4.6)	486 (4.3)	52 (4.6)	470 (5.4)	16 (8.9)		



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

fourth grade, the gender difference varied across countries, with no difference in 22 of the 42 eighth grade countries, a difference favoring boys in seven countries, and a difference favoring girls in the remaining 13 countries. For Botswana and Honduras, which assessed their ninth grade students, gender differences resembled their sixth grade results, with girls having higher mathematics achievement than boys in Botswana and boys higher than girls in Honduras. There were no gender differences among the eighth grade benchmarking participants, with the exception of the state of Indiana, where boys performed better than girls by a small margin.

At both fourth and eighth grades, and consistent with findings from TIMSS 2007, the largest achievement differences favoring girls were often in Arabic-speaking countries from the Middle East, including Qatar, Oman, Kuwait, and Abu Dhabi, UAE at fourth grade and the United Arab Emirates, Palestinian National Authority, Jordan, Bahrain, and Oman at eighth grade.

Trends in Mathematics Achievement by Gender

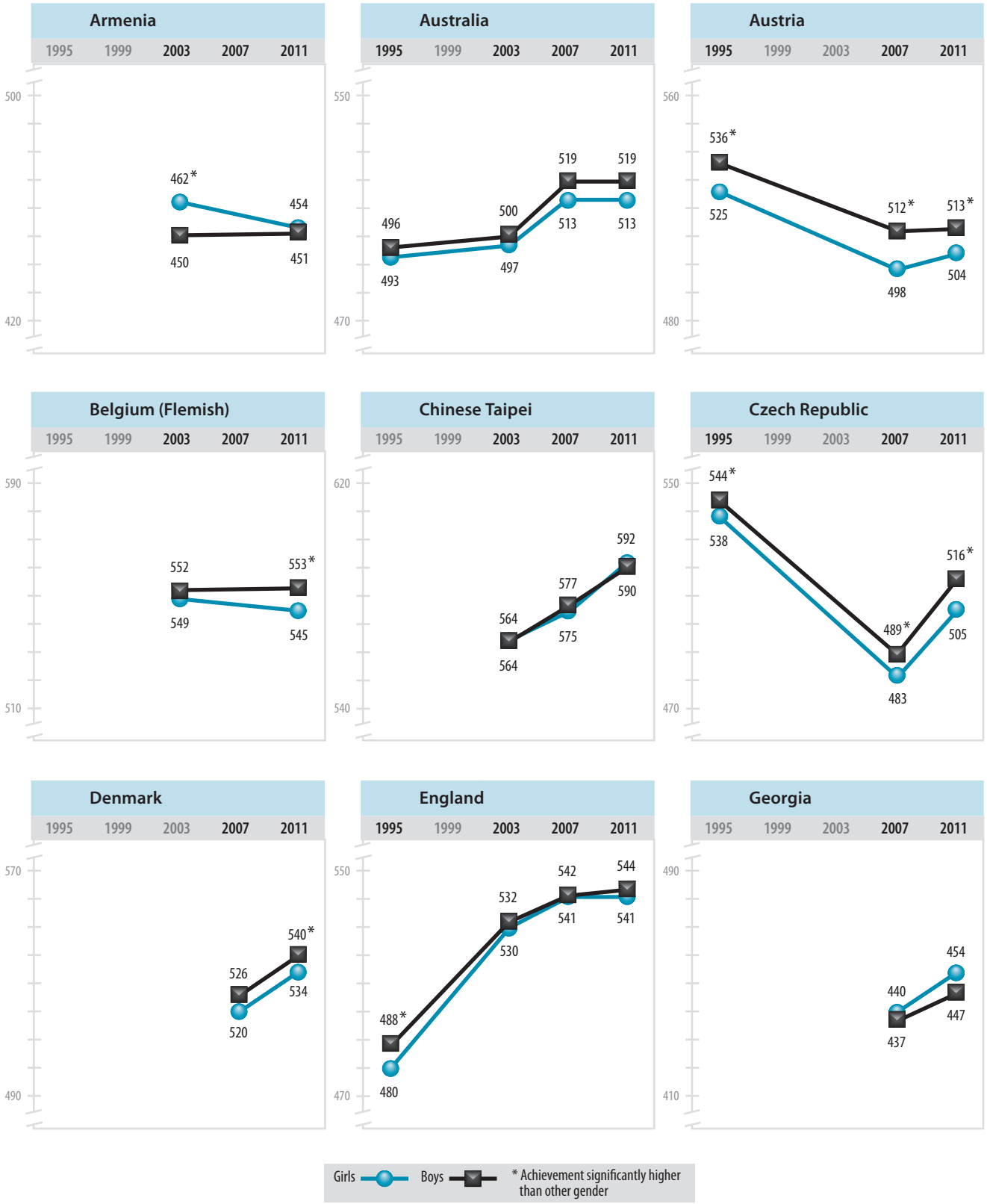
Exhibits 1.12 and 1.13 show graphic representations across the TIMSS assessments of trends in mathematics achievement of boys and girls for fourth and eighth grades, respectively. For each country that participated in one or more of the previous TIMSS assessments, these displays show how trends in mathematics achievement have been influenced by differential performance by boys and girls. Because there are many different patterns across countries, the countries are presented in alphabetical order. The scale interval is the same for each country (10 points) to permit comparisons, although the part of scale shown differs according to each country's average achievement. For countries with gender differences in mathematics achievement, the displays reveal progress (or lack thereof) over time toward gender equity.

As described in the previous section, at the fourth grade there is already gender equity in mathematics achievement in many countries, but there are also countries where overall achievement is less than it might be if both boys and girls performed at the same high level. Countries where fourth grade girls performed consistently below boys (i.e., in 2011 and on at least two other TIMSS assessments) include Austria, the Czech Republic, Italy, the Netherlands, Slovenia, the United States, and the Canadian province of Québec. In Germany, Korea, and the Slovak Republic, boys had higher average achievement than girls on each of the two TIMSS assessments in which they participated. Armenia, Sweden, and Tunisia had gender differences in earlier assessments but not in TIMSS 2011.

With greater gender differences among countries, and trends across five TIMSS assessments, trends at the eighth grade in mathematics achievement for boys and girls follow a variety of paths. A number of countries show an increasing difference across the years, including Bahrain, Indonesia, Jordan, Lithuania, Malaysia, New Zealand, Oman, and Romania. However, there were few instances of countries decreasing an existing gender gap in mathematics achievement.

Exhibit 1.12: Trends in Mathematics Achievement by Gender◊

TIMSS 2011 Mathematics 4th Grade

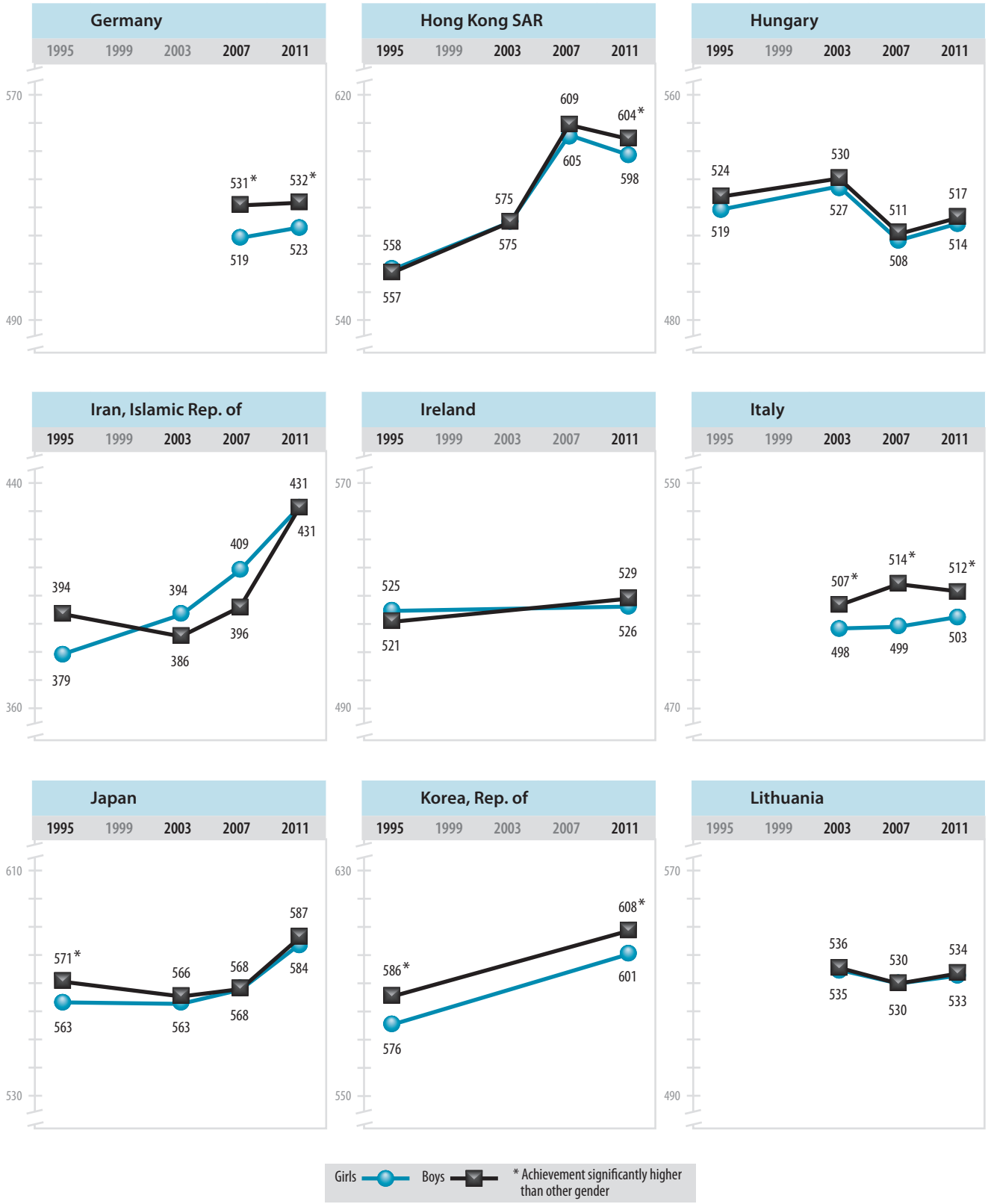


SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

◊ No fourth-grade assessment in 1999.

Scale interval is 10 points for each country, but the part of the scale shown differs according to each country's average achievement.

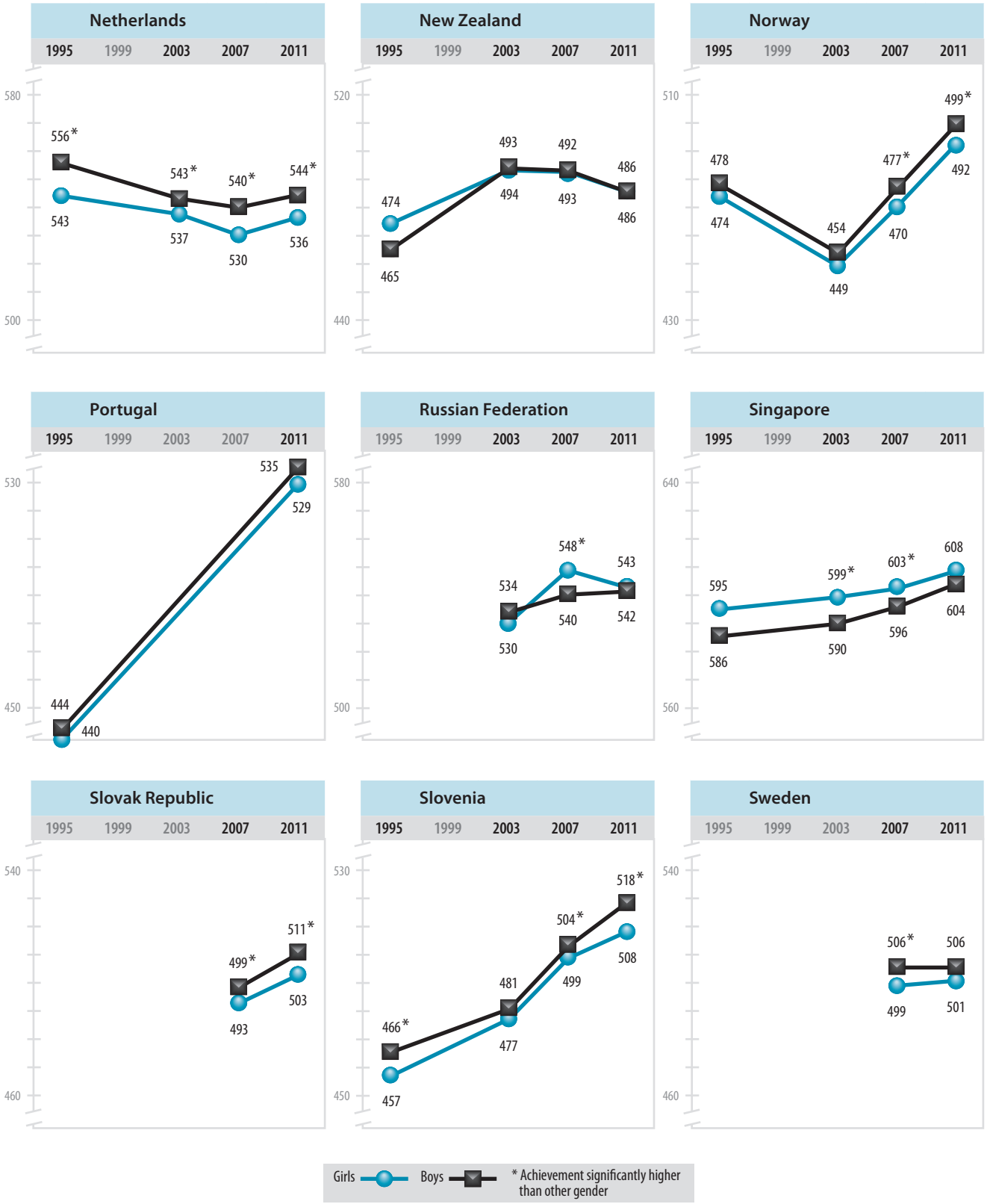
Exhibit 1.12: Trends in Mathematics Achievement by Gender◊ (Continued)



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

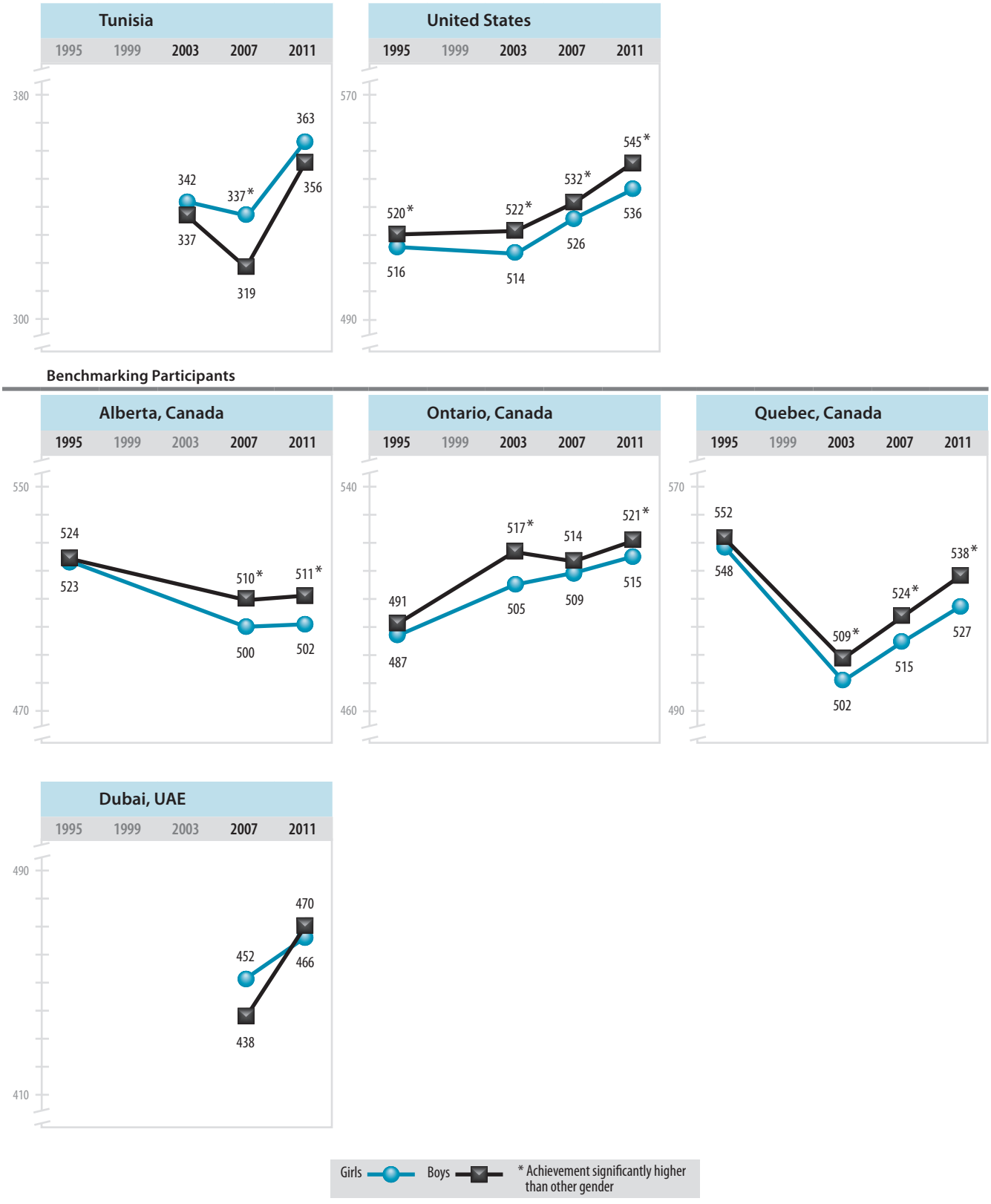
Exhibit 1.12: Trends in Mathematics Achievement by Gender◊ (Continued)

TIMSS 2011 Mathematics 4th Grade



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

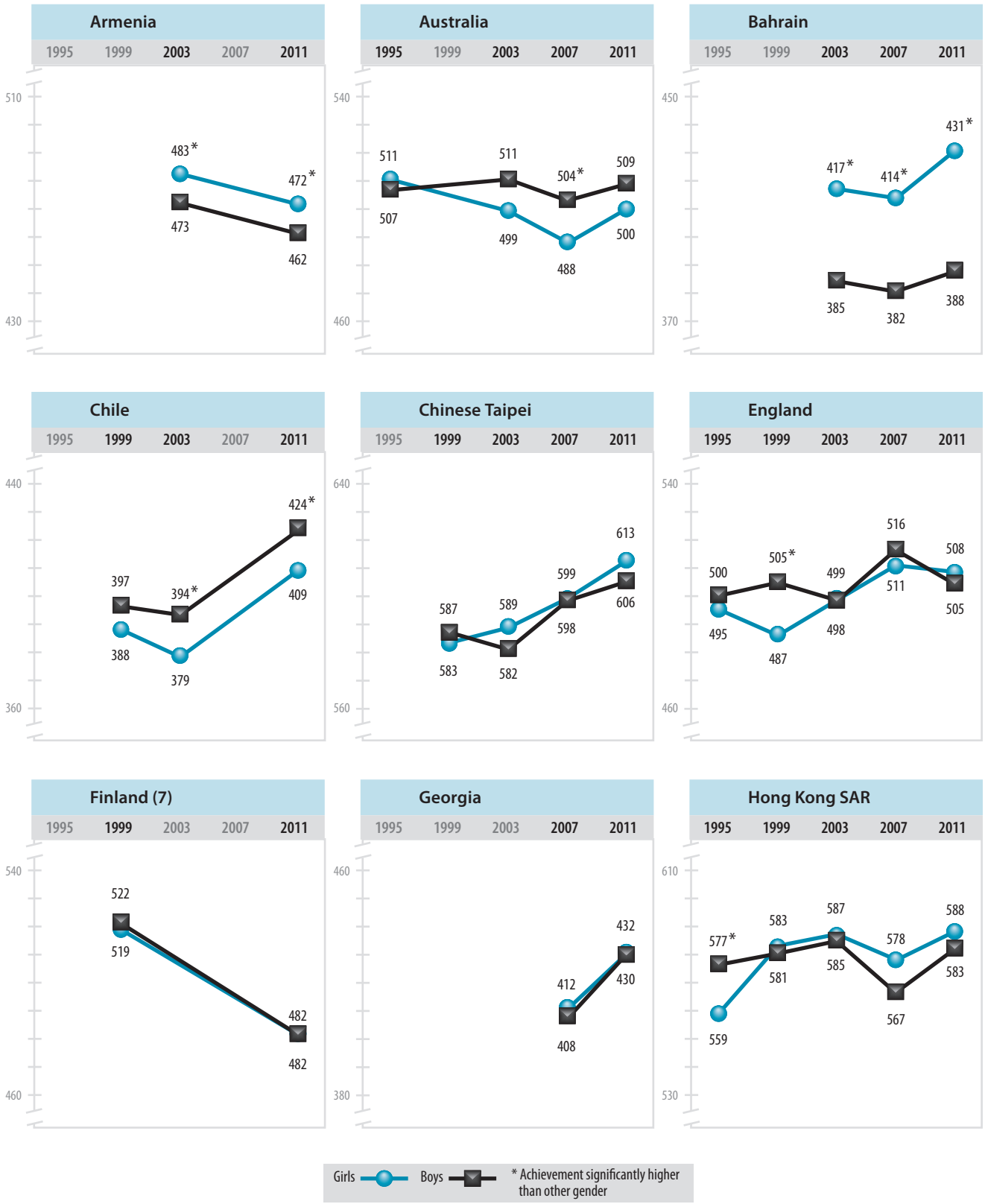
Exhibit 1.12: Trends in Mathematics Achievement by Gender◊ (Continued)



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 1.13: Trends in Mathematics Achievement by Gender

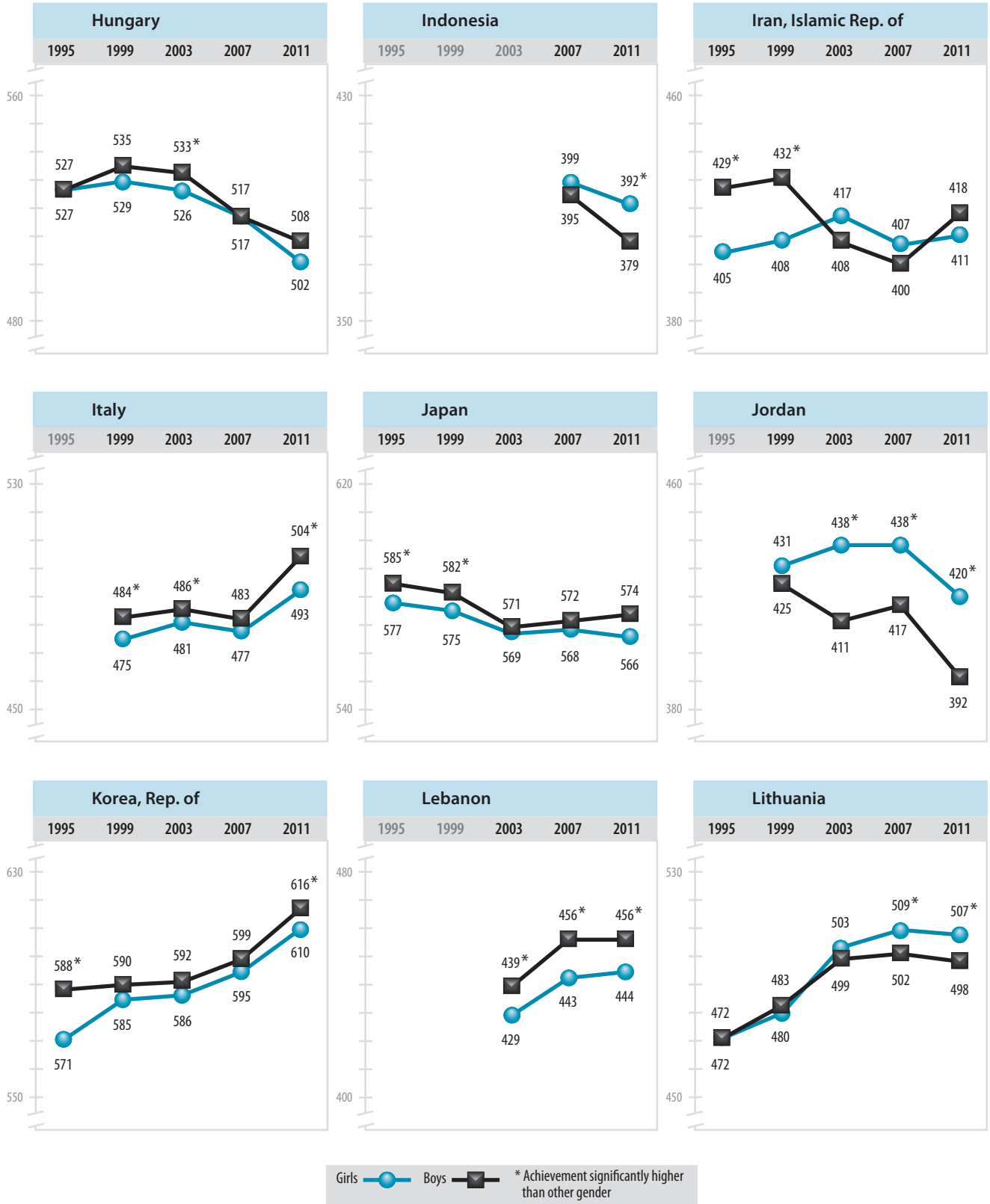
TIMSS 2011 Mathematics 8th Grade



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

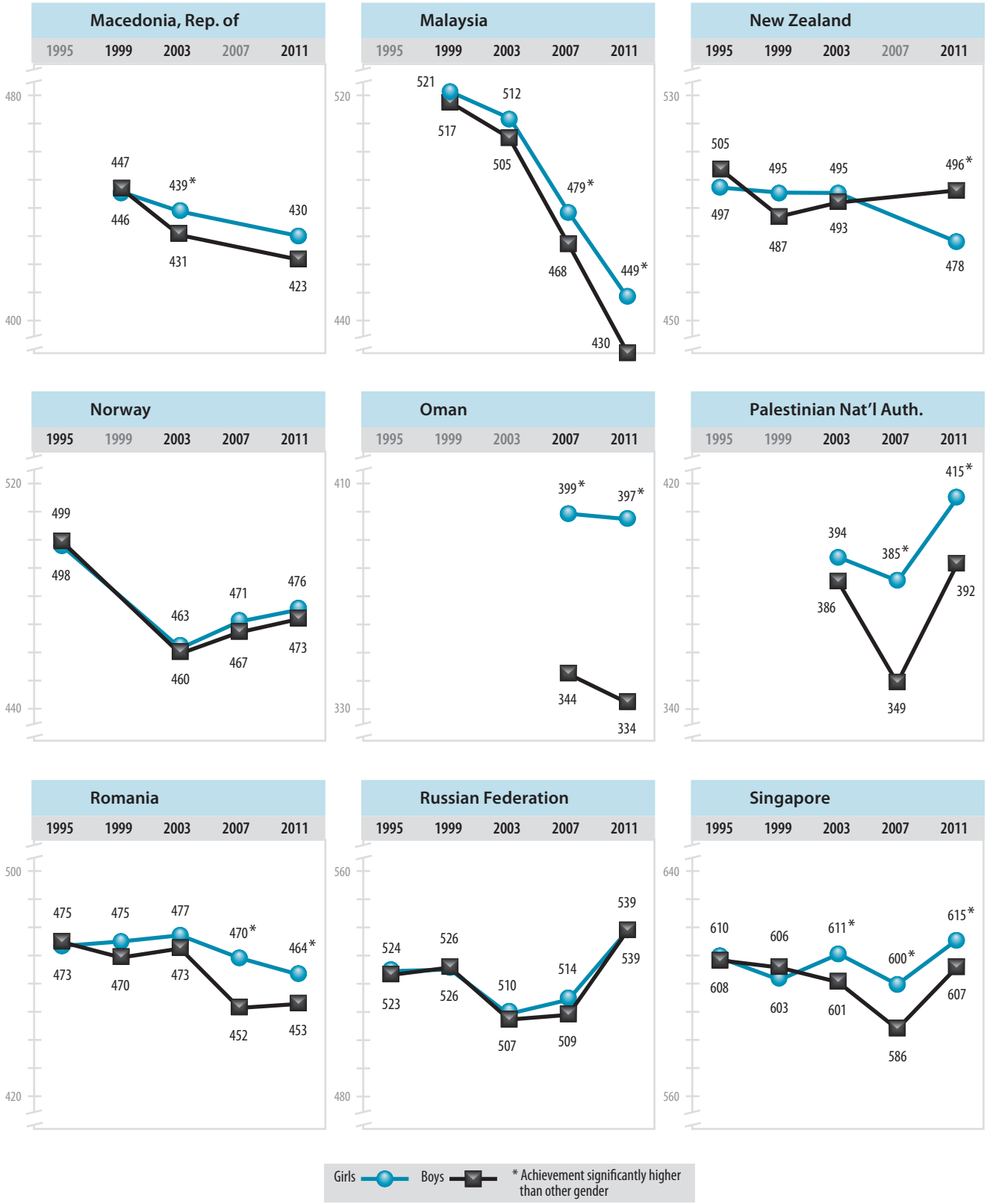
Scale interval is 10 points for each country, but the part of the scale shown differs according to each country's average achievement.

Exhibit 1.13: Trends in Mathematics Achievement by Gender (Continued)



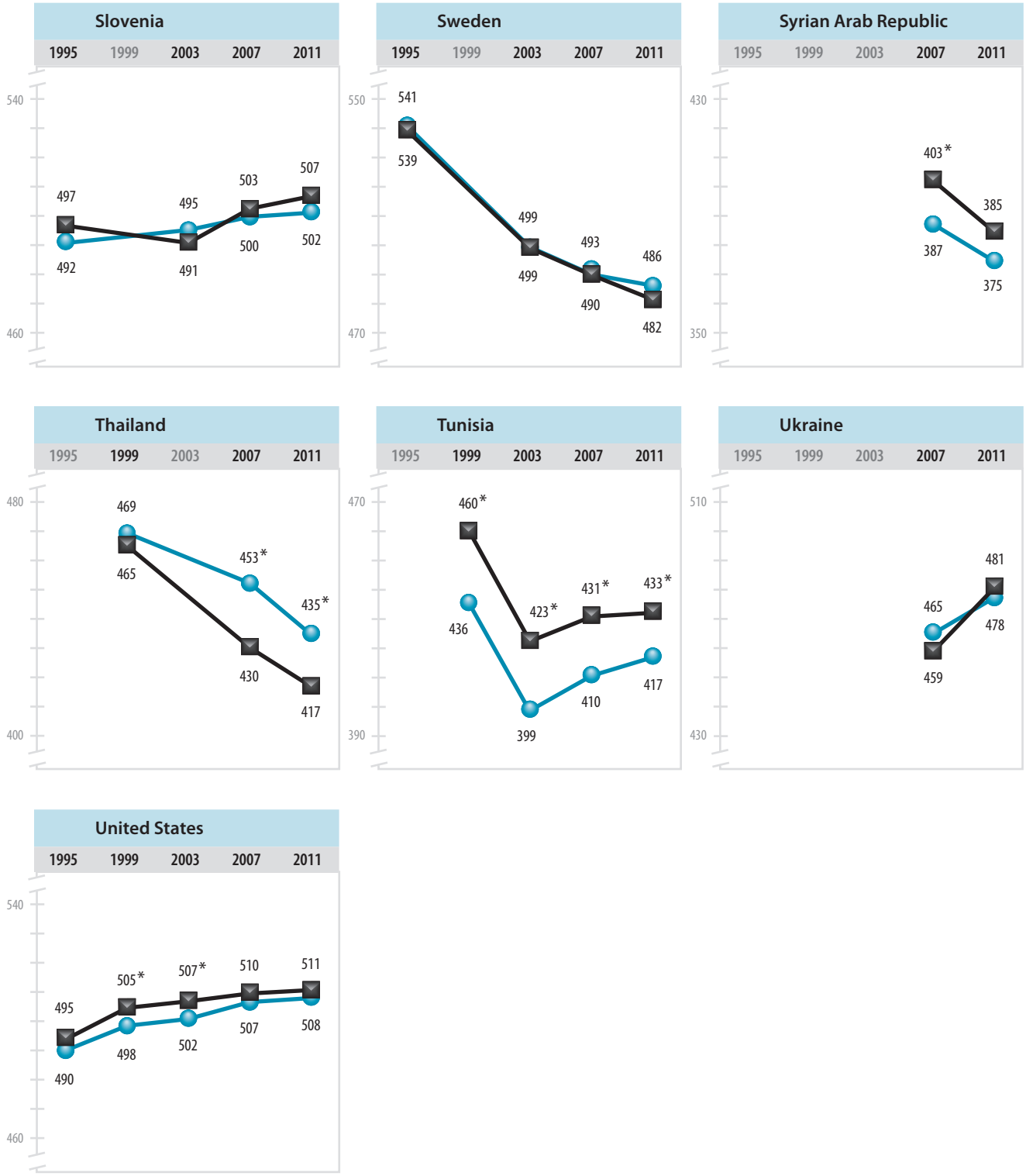
SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 1.13: Trends in Mathematics Achievement by Gender (Continued)



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

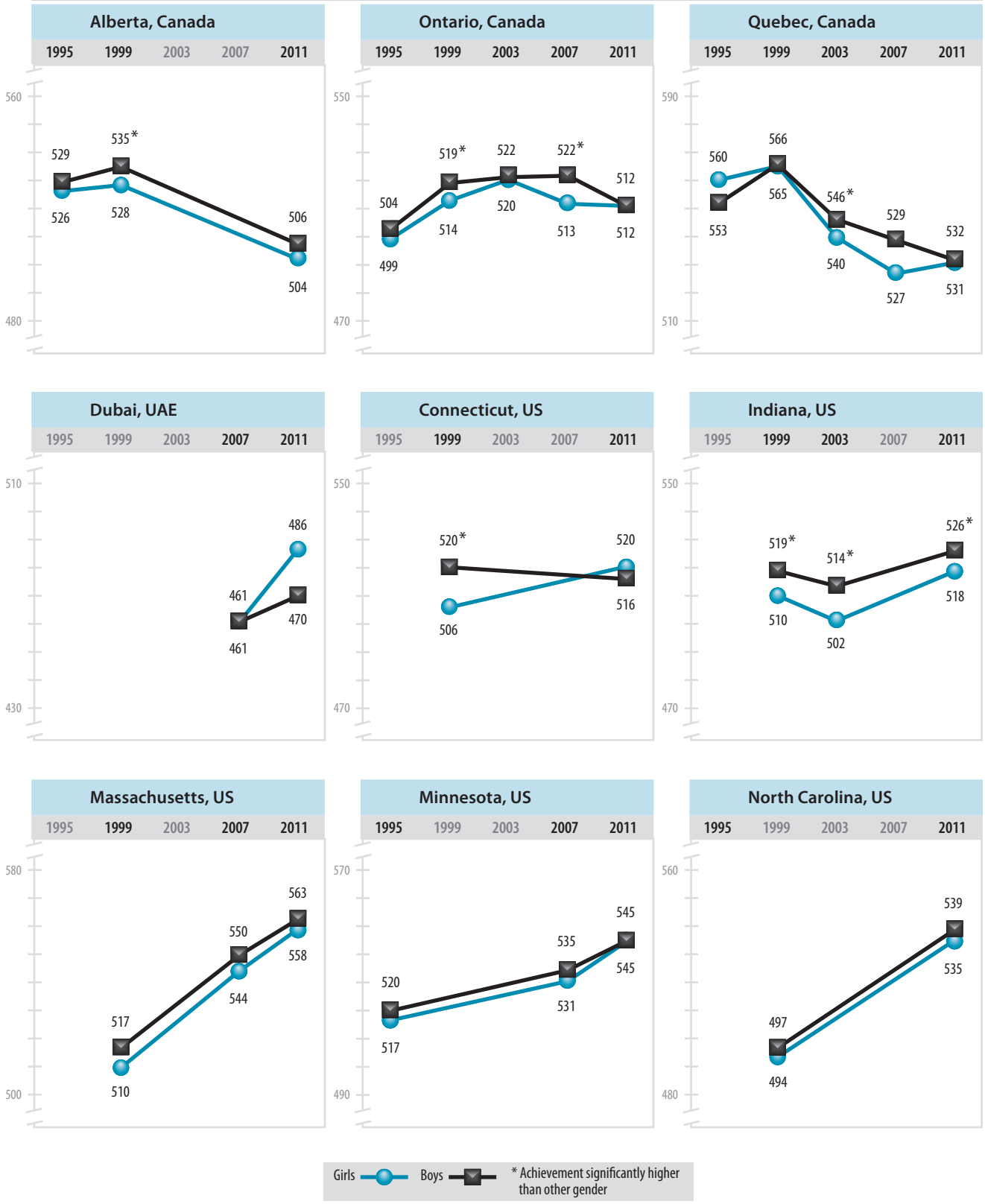
Exhibit 1.13: Trends in Mathematics Achievement by Gender (Continued)



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 1.13: Trends in Mathematics Achievement by Gender (Continued)

Benchmarking Participants



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Chapter 2



Performance at the TIMSS 2011 International Benchmarks

The five East Asian countries had the largest percentages of fourth grade students (30–43%) reach the TIMSS 2011 Advanced International Benchmark. Building on this head start, these five countries pulled away from the rest of the world by a considerable margin at the eighth grade, with by far the largest percentages of students reaching this benchmark—nearly half (47–49%) in Chinese Taipei, Singapore, and Korea.

Remarkably, nine countries raised achievement across their entire fourth grade student distribution, from low to high performers, improving across all four international benchmarks over the past decade; only one declined across all four benchmarks. At the eighth grade, only three countries showed improvement across all benchmarks, and three had declines.

TIMSS Mathematics Benchmarks:

Advanced International Benchmark 625

High International Benchmark 550

Intermediate International Benchmark 475

Low International Benchmark 400

The TIMSS achievement scale summarizes student performance on test items designed to measure breadth of content in number, algebra, geometry, and data as well as a range of cognitive processes within the knowing, applying, and reasoning domains. TIMSS reports achievement at four points along the scale as international benchmarks: Advanced International Benchmark (625), High International Benchmark (550), Intermediate International Benchmark (475), and Low International Benchmark (400).

This chapter presents the mathematics results at the TIMSS 2011 International Benchmarks. To interpret achievement at the benchmarks, the TIMSS & PIRLS International Study Center worked with the TIMSS 2011 Science and Mathematics Item Review Committee (SMIRC) to conduct a detailed scale anchoring analysis to describe mathematics achievement at the benchmarks. The chapter contains those descriptions along with a number of example items together with results, to illustrate performance at the benchmarks.

TIMSS 2011 Mathematics Framework

The items used in TIMSS 2011 were selected and developed based on the TIMSS 2011 Mathematics Framework contained in the *TIMSS 2011 Assessment Frameworks*. The mathematics assessments at the fourth and eighth grade each were organized around two dimensions: a content dimension specifying the subject matter or content domains to be assessed, and a cognitive dimension specifying the thinking processes that students are likely to use as they engage with the content. As illustrated below, the fourth grade has three content domains: number, geometric shapes and measures, and data display. Number received 50 percent of the assessment emphasis, geometric shapes and measures 35 percent, and data display 15 percent. At the eighth grade, there are four content domains: number, algebra, geometry, and data and chance. Number and algebra each received 30 percent of the assessment emphasis, while geometry and data and chance each received 20 percent. The same three cognitive domains—knowing, applying, and reasoning—were used at both fourth and eighth grades, although there was somewhat less emphasis on knowing at the eighth grade and slightly more emphasis on reasoning.

Fourth Grade Content Domains	Eighth Grade Content Domains
50% Number	30% Number
35% Geometric Shapes and Measures	30% Algebra
15% Data Display	20% Geometry
	20% Data and Chance

Fourth Grade Cognitive Domains	Eighth Grade Cognitive Domains
40% Knowing	35% Knowing
40% Applying	40% Applying
20% Reasoning	25% Reasoning

Exhibit 2.1: TIMSS 2011 International Benchmarks of Mathematics Achievement

Advanced International Benchmark

625 *Students can apply their understanding and knowledge in a variety of relatively complex situations and explain their reasoning.* They can solve a variety of multi-step word problems involving whole numbers, including proportions. Students at this level show an increasing understanding of fractions and decimals. Students can apply geometric knowledge of a range of two- and three-dimensional shapes in a variety of situations. They can draw a conclusion from data in a table and justify their conclusion.

High International Benchmark

550 *Students can apply their knowledge and understanding to solve problems.* Students can solve word problems involving operations with whole numbers. They can use division in a variety of problem situations. They can use their understanding of place value to solve problems. Students can extend patterns to find a later specified term. Students demonstrate understanding of line symmetry and geometric properties. Students can interpret and use data in tables and graphs to solve problems. They can use information in pictographs and tally charts to complete bar graphs.

Intermediate International Benchmark

475 *Students can apply basic mathematical knowledge in straightforward situations.* Students at this level demonstrate an understanding of whole numbers and some understanding of fractions. Students can visualize three-dimensional shapes from two-dimensional representations. They can interpret bar graphs, pictographs, and tables to solve simple problems.

Low International Benchmark

400 *Students have some basic mathematical knowledge.* Students can add and subtract whole numbers. They have some recognition of parallel and perpendicular lines, familiar geometric shapes, and coordinate maps. They can read and complete simple bar graphs and tables.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Fourth Grade Results for the TIMSS 2011 International Benchmarks in Mathematics

Fourth Grade TIMSS 2011 International Benchmarks of Mathematics Achievement

Exhibit 2.1 summarizes what fourth grade students scoring at the TIMSS International Benchmarks typically know and can do in mathematics. Detailed descriptions of each benchmark level are presented together with example items in subsequent sections of the chapter.

There was substantial variation in performance between students achieving at the high end of the scale and the low end of the scale. At the fourth grade, students at the Advanced International Benchmark applied their understanding and knowledge in a variety of relatively complex situations and were able to explain their reasoning. They could solve a variety of multi-step word problems, and showed an increasing understanding of fractions and decimals. Also, they applied geometric knowledge in a range of situations and could draw a conclusion from a table. Students at the High International Benchmark could solve word problems involving operations with whole numbers, and were able to interpret and use data in tables and graphs to solve problems. At the Intermediate International Benchmark students demonstrated an understanding of whole numbers, they could visualize three-dimensional shapes from two-dimensional representations, and they could interpret a variety of graphs. Students at the Low International Benchmark were able to add and subtract whole numbers, recognize some geometric shapes, and read simple graphs and tables.

Fourth Grade Achievement at the TIMSS 2011 International Benchmarks of Mathematics Achievement

Exhibit 2.2 presents the percentage of students reaching each TIMSS 2011 International Benchmark. The results are presented in descending order according to the percentage of students reaching the Advanced International Benchmark, first for countries that tested fourth grade students, followed by those who tested sixth grade students and benchmarking participants on the second page. The percentage of students reaching the Advanced Benchmark is indicated in the bar graph with a black dot. Because students who reached the Advanced Benchmark also reached the other benchmarks, the percentages illustrated in the graphic and shown in the columns to the right are cumulative.

The five East Asian countries had the largest percentages of students reaching the Advanced International Benchmark. Singapore had 43 percent of their students reach the Advanced International Benchmark, followed by

Korea (39%), Hong Kong SAR (37%), Chinese Taipei (34%), and Japan (30%). Northern Ireland was next with 24 percent, then England, 18 percent, followed by a group of eight countries with 10 to 13 percent.

Exhibit 2.2 also provides useful information about the distribution of achievement in each country. For example, even though the Netherlands had fewer students (5%) reaching the advanced level than did the top-performing Asian countries, it had just as many fourth grade students reaching the low level (99%).

As a point of reference, Exhibit 2.2 provides the median at the fourth grade for each of the benchmarks at the bottom of each of the four right hand columns. By definition, half of the countries will have a percentage in the column above the median and half will be below the median. The median percentages of students reaching the International Benchmarks were as follows: Advanced–4 percent, High–28 percent, and Intermediate–69 percent. Many countries are able to educate almost all of their fourth grade students to a basic level of mathematics achievement, as evidenced by a median percentage for the Low International Benchmark of 90 percent.

Fourth Grade Trends in Performance at the TIMSS 2011 International Benchmarks of Mathematics Achievement

Exhibit 2.3 shows the changes in percentages of fourth grade students reaching the benchmarks for countries and benchmarking participants that also participated in TIMSS 1995, 2003, and/or 2007. An up arrow indicates that the percentage of students reaching a benchmark is higher in 2011 than the past cycle, and a down arrow indicates that the percentage is lower in 2011. The patterns in this exhibit generally mirror the trends in average achievement discussed in Chapter 1, and can provide further information about countries' improvement or decline over time.

In general, there were more improvements across the International Benchmarks in 2011 than there were declines. Remarkably, a number of countries have improved since 1995 at all four benchmarks, including Korea (with a ceiling effect at the Low Benchmark), Hong Kong SAR, Japan, England, the United States, Australia, Portugal, Slovenia, and Iran. Singapore and Norway had gains at all except the Advanced Benchmark, and New Zealand improved at the two lower levels.

The Czech Republic was the only country to show declines at all four levels since 1995, although it showed signs of recovery with improvement at all four levels since 2007. Austria declined at all except the low level, and the Netherlands declined at the two top levels.

Exhibit 2.2: Performance at the International Benchmarks of Mathematics Achievement

TIMSS 2011 Mathematics 4th Grade



Country	Advanced Benchmark (625)	High Benchmark (550)	Intermediate Benchmark (475)	Low Benchmark (400)
[2] Singapore	43 (2.0)	78 (1.4)	94 (0.7)	99 (0.2)
Korea, Rep. of	39 (1.3)	80 (0.8)	97 (0.4)	100 (0.1)
[2] Hong Kong SAR	37 (1.8)	80 (1.6)	96 (1.0)	99 (0.5)
Chinese Taipei	34 (1.2)	74 (1.1)	93 (0.6)	99 (0.2)
Japan	30 (1.0)	70 (1.0)	93 (0.5)	99 (0.2)
† Northern Ireland	24 (1.3)	59 (1.4)	85 (1.2)	96 (0.5)
England	18 (1.3)	49 (1.7)	78 (1.4)	93 (0.7)
Russian Federation	13 (1.4)	47 (2.0)	82 (1.4)	97 (0.6)
[2] United States	13 (0.8)	47 (1.1)	81 (0.8)	96 (0.3)
Finland	12 (0.8)	49 (1.3)	85 (1.2)	98 (0.4)
[1 2] Lithuania	10 (0.8)	43 (1.5)	79 (1.2)	96 (0.6)
Belgium (Flemish)	10 (0.8)	50 (1.3)	89 (0.8)	99 (0.2)
Australia	10 (0.9)	35 (1.4)	70 (1.4)	90 (1.0)
[2] Denmark	10 (1.0)	44 (1.5)	82 (1.1)	97 (0.6)
Hungary	10 (0.8)	37 (1.4)	70 (1.5)	90 (1.0)
[2] Serbia	9 (0.8)	36 (1.5)	70 (1.4)	90 (1.0)
Ireland	9 (0.9)	41 (1.6)	77 (1.4)	94 (0.6)
Portugal	8 (1.2)	40 (1.9)	80 (1.7)	97 (0.6)
[2] Kazakhstan	7 (1.0)	29 (2.0)	62 (2.4)	88 (1.2)
Romania	7 (0.6)	28 (1.7)	57 (2.2)	79 (1.9)
Slovak Republic	5 (0.7)	30 (1.7)	69 (1.6)	90 (1.2)
Germany	5 (0.5)	37 (1.4)	81 (1.3)	97 (0.6)
[2] Azerbaijan	5 (1.0)	21 (2.3)	46 (2.3)	72 (1.9)
Italy	5 (0.6)	28 (1.4)	69 (1.3)	93 (0.8)
† Netherlands	5 (0.6)	44 (1.5)	88 (0.8)	99 (0.2)
Czech Republic	4 (0.5)	30 (1.5)	72 (1.3)	93 (0.8)
Turkey	4 (0.5)	21 (1.4)	51 (1.7)	77 (1.5)
Slovenia	4 (0.5)	31 (1.4)	72 (1.4)	94 (0.6)
New Zealand	4 (0.5)	23 (1.1)	58 (1.3)	85 (0.8)
Malta	4 (0.3)	25 (0.9)	63 (0.8)	88 (0.6)
Sweden	3 (0.4)	25 (1.2)	69 (1.4)	93 (0.7)
Austria	2 (0.3)	26 (1.5)	70 (1.9)	95 (0.8)
‡ Norway	2 (0.4)	21 (1.6)	63 (1.8)	91 (1.0)
United Arab Emirates	2 (0.2)	12 (0.5)	35 (0.8)	64 (1.0)
Armenia	2 (0.4)	14 (1.0)	41 (1.7)	72 (1.4)
[2] Qatar	2 (0.4)	10 (0.9)	29 (1.4)	55 (1.6)
[1] Georgia	2 (0.5)	12 (1.0)	41 (1.7)	72 (1.7)
Chile	2 (0.3)	14 (0.7)	44 (1.1)	77 (1.2)
Saudi Arabia	2 (0.7)	7 (1.3)	24 (1.9)	55 (1.8)
Poland	2 (0.3)	17 (1.1)	56 (1.3)	87 (0.9)
[2] Croatia	2 (0.3)	19 (1.0)	60 (1.2)	90 (0.9)
Bahrain	1 (0.3)	10 (0.9)	34 (1.4)	67 (1.4)
Spain	1 (0.3)	17 (1.1)	56 (1.9)	87 (1.3)
Thailand	1 (0.3)	12 (1.4)	43 (2.3)	77 (2.1)
Iran, Islamic Rep. of	1 (0.2)	9 (0.8)	33 (1.4)	64 (1.5)
Ψ Oman	1 (0.1)	5 (0.3)	20 (0.8)	46 (1.2)
Ж Morocco	0 (0.2)	2 (0.7)	10 (1.2)	26 (1.5)
[1] Ж Kuwait	0 (0.1)	1 (0.3)	9 (0.7)	30 (1.3)
Ж Yemen	0 (0.0)	0 (0.2)	2 (0.5)	9 (1.0)
Ψ Tunisia	0 (0.0)	2 (0.3)	11 (1.0)	35 (1.8)
International Median	4	28	69	90

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Ж Average achievement not reliably measured because the percentage of students with achievement too low for estimation exceeds 25%.

Ψ Reservations about reliability of average achievement because the percentage of students with achievement too low for estimation is less than 25% but exceeds 15%.

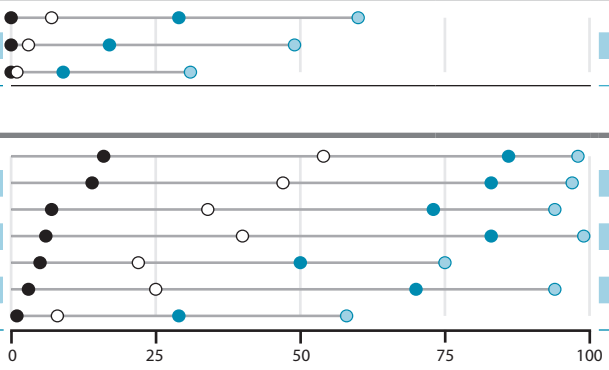
See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Exhibit 2.2: Performance at the International Benchmarks of Mathematics Achievement (Continued)

TIMSS 2011 Mathematics 4th Grade

Country	Percentages of Students Reaching International Benchmarks (● Advanced ○ High ● Intermediate ○ Low)	Advanced Benchmark (625)	High Benchmark (550)	Intermediate Benchmark (475)	Low Benchmark (400)
Sixth Grade Participants					
Botswana		0 (0.1)	7 (1.1)	29 (1.7)	60 (1.6)
Ψ Honduras		0 (0.1)	3 (0.8)	17 (2.1)	49 (2.5)
Ж Yemen		0 (0.0)	1 (0.3)	9 (1.0)	31 (2.1)
Benchmarking Participants					
1 2 North Carolina, US		16 (1.8)	54 (2.6)	86 (1.7)	98 (0.6)
1 3 Florida, US		14 (1.3)	47 (1.7)	83 (1.2)	97 (0.4)
Ontario, Canada		7 (0.8)	34 (1.7)	73 (1.6)	94 (0.7)
Quebec, Canada		6 (0.8)	40 (1.7)	83 (1.2)	99 (0.2)
Dubai, UAE		5 (0.5)	22 (0.8)	50 (0.8)	75 (0.9)
2 Alberta, Canada		3 (0.5)	25 (1.6)	70 (1.4)	94 (0.9)
Abu Dhabi, UAE		1 (0.4)	8 (1.1)	29 (2.0)	58 (2.0)



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 2.3: Trends in Percentages of Students Reaching the International Benchmarks of Mathematics Achievement

TIMSS 2011 Mathematics 4th Grade

Country	Advanced International Benchmark (625)				High International Benchmark (550)			
	Percent of Students				Percent of Students			
	2011	2007	2003	1995	2011	2007	2003	1995
Singapore	43	41	38	38	78	74	73	70 ▲
Korea, Rep. of	39			25 ▲	80			70 ▲
Hong Kong SAR	37	40	22 ▲	17 ▲	80	81	67 ▲	56 ▲
Chinese Taipei	34	24 ▲	16 ▲		74	66 ▲	61 ▲	
Japan	30	23 ▲	21 ▲	22 ▲	70	61 ▲	60 ▲	61 ▲
England	18	16	14 ▲	7 ▲	49	48	43 ▲	24 ▲
Russian Federation	13	16	11		47	48	41	
United States	13	10 ▲	7 ▲	9 ▲	47	40 ▲	35 ▲	37 ▲
Lithuania	10	10	10		43	42	44	
Belgium (Flemish)	10		10		50		51	
Australia	10	9	5 ▲	6 ▲	35	35	26 ▲	27 ▲
Denmark	10	7 ▲			44	36 ▲		
Hungary	10	9	10	11	37	35	41 ▼	38
Ireland	9			10	41			40
Portugal	8			1 ▲	40			11 ▲
Slovak Republic	5	5			30	26		
Germany	5	6			37	37		
Italy	5	6	6		28	29	29	
Netherlands	5	7	5	12 ▼	44	42	44	50 ▼
Czech Republic	4	2 ▲		16 ▼	30	19 ▲		46 ▼
Slovenia	4	3	2 ▲	2 ▲	31	25 ▲	18 ▲	14 ▲
New Zealand	4	5	5	4	23	26 ▼	26 ▼	19
Sweden	3	3			25	24		
Austria	2	3		10 ▼	26	26		42 ▼
Norway	2	2	1 ▲	2	21	15 ▲	10 ▲	16 ▲
Armenia	2		2		14		13	
Georgia	2	1			12	10		
Iran, Islamic Rep. of	1	0 ▲	0 ▲	0 ▲	9	3 ▲	2 ▲	3 ▲
Ψ Tunisia	0	0	0		2	1	1	
Benchmarking Participants								
Ontario, Canada	7	4 ▲	5	4 ▲	34	29 ▲	29	22 ▲
Quebec, Canada	6	5	3 ▲	13 ▼	40	34 ▲	25 ▲	50 ▼
Dubai, UAE	5	2 ▲			22	12 ▲		
Alberta, Canada	3	3		9 ▼	25	25		39 ▼

▲ 2011 percent significantly higher

▼ 2011 percent significantly lower

Ψ Reservations about reliability of average achievement because the percentage of students with achievement too low for estimation does not exceed 25% but exceeds 15%. Such annotations in exhibits with trend data began in 2011, so data from assessments prior to 2011 are not annotated for reservations.

An empty cell indicates a country did not participate in that year's assessment.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 2.3: Trends in Percentages of Students Reaching the International Benchmarks of Mathematics Achievement (Continued)

Country	Intermediate International Benchmark (475)				Low International Benchmark (400)			
	Percent of Students				Percent of Students			
	2011	2007	2003	1995	2011	2007	2003	1995
Singapore	94	92	91	89 ▲	99	98	97 ▲	96 ▲
Korea, Rep. of	97			94 ▲	100			99
Hong Kong SAR	96	97	94 ▲	87 ▲	99	100	99	97 ▲
Chinese Taipei	93	92	92		99	99	99	
Japan	93	89 ▲	89 ▲	89 ▲	99	98 ▲	98 ▲	98 ▲
England	78	79	75	54 ▲	93	94	93	82 ▲
Russian Federation	82	81	76 ▲		97	95 ▲	95	
United States	81	77 ▲	72 ▲	71 ▲	96	95	93 ▲	92 ▲
Lithuania	79	77	79		96	94	96	
Belgium (Flemish)	89		90		99		99	
Australia	70	71	64 ▲	61 ▲	90	91	88	86 ▲
Denmark	82	76 ▲			97	95		
Hungary	70	67	76 ▼	72	90	88	94 ▼	91
Ireland	77			73	94			91 ▲
Portugal	80			37 ▲	97			70 ▲
Slovak Republic	69	63 ▲			90	88		
Germany	81	78			97	96		
Italy	69	67	65		93	91	89 ▲	
Netherlands	88	84 ▲	89	87	99	98 ▲	99	99
Czech Republic	72	59 ▲		79 ▼	93	88 ▲		95 ▼
Slovenia	72	67 ▲	55 ▲	45 ▲	94	92 ▲	84 ▲	77 ▲
New Zealand	58	61	61	51 ▲	85	85	86	78 ▲
Sweden	69	68			93	93		
Austria	70	69		77 ▼	95	93 ▲		94
Norway	63	52 ▲	41 ▲	53 ▲	91	83 ▲	75 ▲	84 ▲
Armenia	41		43		72		75	
Georgia	41	35 ▲			72	67 ▲		
Iran, Islamic Rep. of	33	20 ▲	17 ▲	15 ▲	64	53 ▲	45 ▲	44 ▲
Ψ Tunisia	11	9 ▲	9		35	28 ▲	28 ▲	
Benchmarking Participants								
Ontario, Canada	73	71	70	59 ▲	94	94	94	86 ▲
Quebec, Canada	83	74 ▲	69 ▲	87 ▼	99	96 ▲	94 ▲	98
Dubai, UAE	50	37 ▲			75	69 ▲		
Alberta, Canada	70	69		74	94	94		93

▲ 2011 percent significantly higher

▼ 2011 percent significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Fourth Grade TIMSS 2011 Low International Benchmark

Exhibit 2.4 presents the description of student achievement at the Low International Benchmark. Students demonstrated some basic mathematical knowledge, including adding and subtracting with whole numbers. They recognized familiar geometric shapes, and could read and complete simple bar graphs and tables.

As specified in the TIMSS 2011 Mathematics Framework, half of the fourth grade assessment was devoted to items in the number domain. More specifically, the framework covered whole numbers, fractions and decimals, number sentences, and patterns. Working with whole numbers is the foundation of mathematics in the primary school; and often, items answered correctly by students achieving at the lower scale levels involved operations with whole numbers and decimals.

Exhibit 2.5 presents Example Item 1, an addition word problem exemplifying student achievement at the Low International Benchmark. In TIMSS 2011, some of the constructed response items were worth 1 point and some 2 points, and the illustrative answers provided with the example items always show an answer that received full credit. The number of possible points for each constructed-response item is indicated across the bottom of the exhibit. With an international average of 73 percent correct across the fourth grade countries, this whole number addition item was relatively easy for students in many countries.

Exhibit 2.6 contains Example Item 2 from the data display domain. By the fourth grade, students should be developing skills in representing data, and this item is an example of the types of problems successfully solved by students reaching the Low Benchmark. The item asked students to complete a bar graph based on given information. Again, the international average was 73 percent, and this task was relatively easy for students in a number of countries

Exhibit 2.4: Description of the TIMSS 2011 Low International Benchmark (400) of Mathematics Achievement

Low International Benchmark

400

Summary

Students have some basic mathematical knowledge. Students can add and subtract whole numbers. They have some recognition of parallel and perpendicular lines, familiar geometric shapes, and coordinate maps. They can read and complete simple bar graphs and tables.

Students at this level can add and subtract whole numbers. For example, they can add a four-digit and a three-digit whole number. They are familiar with numbers into the thousands.

Students have some recognition of parallel and perpendicular lines and familiar geometric shapes. They can locate positions on a map (e.g., A3). Students can read and complete simple bar graphs and tables.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 2.5: Low International Benchmark – Example Item 1

Country	Percent Full Credit
[2] Singapore	93 (0.8) ▲
Korea, Rep. of	93 (1.2) ▲
Japan	91 (1.1) ▲
Chinese Taipei	89 (1.6) ▲
Portugal	89 (1.6) ▲
[2] Croatia	89 (1.2) ▲
[2] Serbia	87 (1.7) ▲
[2] Hong Kong SAR	86 (1.8) ▲
Russian Federation	86 (1.3) ▲
[2] United States	84 (0.9) ▲
Hungary	84 (1.6) ▲
Slovak Republic	83 (1.7) ▲
Italy	83 (1.7) ▲
Spain	83 (1.7) ▲
[1 2] Lithuania	82 (1.9) ▲
Ireland	82 (1.8) ▲
Slovenia	81 (2.2) ▲
Belgium (Flemish)	81 (1.8) ▲
Turkey	81 (2.0) ▲
† Netherlands	81 (1.9) ▲
Malta	81 (1.7) ▲
[2] Kazakhstan	80 (2.3) ▲
† Northern Ireland	80 (2.3) ▲
Czech Republic	79 (2.4) ▲
Austria	79 (1.8) ▲
Germany	79 (1.5) ▲
England	78 (2.3) ▲
Romania	77 (2.2) ▲
Chile	77 (1.8) ▲
[2] Denmark	77 (1.7) ▲
Thailand	76 (2.5)
Sweden	75 (2.2)
[1] Georgia	75 (2.3)
Poland	75 (2.1)
International Avg.	73 (0.3)
Iran, Islamic Rep. of	70 (2.1)
Armenia	70 (1.8)
Australia	69 (2.2)
[2] Azerbaijan	68 (2.6)
Finland	68 (2.6) ▼
‡ Norway	67 (2.7) ▼
Bahrain	64 (2.4) ▼
United Arab Emirates	54 (1.3) ▼
New Zealand	52 (1.7) ▼
Tunisia	48 (2.4) ▼
[2] Qatar	48 (1.9) ▼
Oman	41 (1.6) ▼
Saudi Arabia	39 (2.4) ▼
Morocco	35 (2.1) ▼
[1] Kuwait	24 (1.9) ▼
Yemen	15 (1.9) ▼

Content Domain: Number

Cognitive Domain: Applying

Description: Solves a word problem involving addition of three-digit whole numbers

There are 218 passengers and 191 crew members on a ship.
How many people are on the ship altogether?

Answer: 409

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The answer shown illustrates the type of student response that was given 1 of 1 points.

Country	Percent Full Credit
Sixth Grade Participants	
Botswana	74 (1.9)
Honduras	67 (2.7) ▼
Yemen	34 (2.7) ▼

Country	Percent Full Credit
Benchmarking Participants	
[1 2] North Carolina, US	88 (2.0) ▲
Quebec, Canada	88 (1.5) ▲
[1 3] Florida, US	87 (2.0) ▲
[2] Alberta, Canada	76 (2.2)
Ontario, Canada	74 (2.3)
Dubai, UAE	70 (1.7)
Abu Dhabi, UAE	47 (2.5) ▼

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

▲ Percent significantly higher than international average

▼ Percent significantly lower than international average

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Exhibit 2.6: Low International Benchmark – Example Item 2

Country	Percent Full Credit
Korea, Rep. of	97 (0.7) ▲
2 Singapore	95 (0.8) ▲
2 Hong Kong SAR	95 (1.1) ▲
Japan	93 (1.1) ▲
† Northern Ireland	92 (1.6) ▲
† Netherlands	91 (1.5) ▲
England	89 (1.3) ▲
Finland	88 (1.7) ▲
Germany	88 (1.2) ▲
1 2 Lithuania	87 (1.9) ▲
Ireland	87 (1.5) ▲
Chinese Taipei	87 (1.8) ▲
Belgium (Flemish)	86 (1.3) ▲
Australia	84 (1.6) ▲
Portugal	84 (2.0) ▲
2 Denmark	84 (1.7) ▲
Sweden	83 (2.0) ▲
Malta	83 (1.8) ▲
Hungary	83 (1.5) ▲
Russian Federation	81 (1.6) ▲
New Zealand	81 (2.2) ▲
Austria	80 (1.9) ▲
Slovenia	80 (1.9) ▲
Thailand	78 (2.5)
2 United States	78 (1.2) ▲
Spain	78 (1.9) ▲
Slovak Republic	77 (1.7) ▲
Czech Republic	77 (2.4)
Italy	77 (2.1)
Bahrain	75 (2.1)
2 Croatia	74 (2.3)
‡ Norway	74 (2.5)
International Avg.	73 (0.3)
Turkey	73 (2.1)
2 Kazakhstan	73 (2.7)
Poland	73 (2.0)
2 Qatar	70 (2.0)
Chile	69 (2.1) ▼
United Arab Emirates	68 (1.3) ▼
2 Serbia	67 (2.3) ▼
Romania	62 (2.7) ▼
Saudi Arabia	60 (2.4) ▼
Oman	57 (1.6) ▼
1 Georgia	56 (2.7) ▼
1 Kuwait	55 (1.8) ▼
Iran, Islamic Rep. of	54 (2.0) ▼
2 Azerbaijan	47 (2.7) ▼
Armenia	41 (2.4) ▼
Tunisia	24 (2.0) ▼
Morocco	23 (1.8) ▼
Yemen	13 (1.6) ▼

Content Domain: Data Display

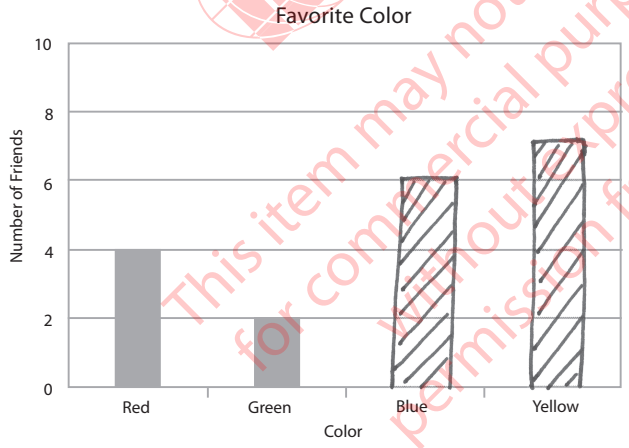
Cognitive Domain: Applying

Description: Completes a bar graph from data in a table

Darin asked his friends to name their favorite color. He collected the information in the table shown below.

Favorite Color	Number of Friends
Red	4
Green	2
Blue	6
Yellow	7

Then Darin started to draw a graph to show the information. Complete Darin's graph.



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The answer shown illustrates the type of student response that was given 1 of 1 points.

Country	Percent Full Credit
Sixth Grade Participants	
Botswana	62 (2.0) ▼
Honduras	40 (3.3) ▼
Yemen	31 (2.9) ▼

Country	Percent Full Credit
Benchmarking Participants	
Quebec, Canada	89 (1.6) ▲
Ontario, Canada	87 (1.5) ▲
1 2 North Carolina, US	82 (2.2) ▲
2 Alberta, Canada	81 (2.0) ▲
1 3 Florida, US	80 (2.3) ▲
Dubai, UAE	75 (1.7)
Abu Dhabi, UAE	62 (2.5) ▼

▲ Percent significantly higher than international average

▼ Percent significantly lower than international average

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Fourth Grade TIMSS 2011 Intermediate International Benchmark

Exhibit 2.7 provides the description of student achievement at the Intermediate International Benchmark. Most countries had the majority of their students reaching this benchmark. Students at this level demonstrated an understanding of whole numbers, as well as some understanding of one-place decimals, proportion, geometric patterns, symmetry, and movement on a grid. They can match data in pie charts and tables to bar graphs.

Example Item 3 in Exhibit 2.8 is a word problem involving addition of one-place decimals. The average percent correct was 60 percent, with a considerable range in performance. In Korea and Japan, 95–97 percent of students answered correctly, compared to 19 percent in Yemen and Kuwait.

Exhibit 2.9 presents Example Item 4 from the domain of geometric figures. It asks students to visualize a three-dimensional shape made of cubes. On average, internationally, 63 percent of the fourth grade students answered correctly. Across the fourth grade, sixth grade, and benchmarking participants, in most cases the majority of students could do this task.

Exhibit 2.10 presents Example 5 from the data display domain, asking students to choose which graph presents the same information as shown in the pie chart. The international average was 71 percent correct, and it is clear from the country-by-country results that this material is covered in most but not all countries. In general, most students did relatively well across the fourth grade, sixth grade, and benchmarking participants.

Exhibit 2.7: Description of the TIMSS 2011 Intermediate International Benchmark (475) of Mathematics Achievement

Intermediate International Benchmark

475

Summary

Students can apply basic mathematical knowledge in straightforward situations. Students at this level demonstrate an understanding of whole numbers and some understanding of fractions. Students can visualize three-dimensional shapes from two-dimensional representations. They can interpret bar graphs, pictographs, and tables to solve simple problems.

Students at this level demonstrate an understanding of whole numbers. For example, they can identify the value of a digit in a four-digit number and solve problems involving multiplication of one-digit numbers. Students can add one-place decimals and can identify an expression that represents a situation involving addition or subtraction. They can identify representations of unit and non-unit fractions and solve simple proportional problems involving halving. They can extend simple geometric patterns to determine the next terms.

Students can visualize three-dimensional shapes from two-dimensional representations including recognizing some properties of familiar solids. They can order a set of angles by size. They can recognize a line of symmetry and draw the reflection of a simple shape. They can identify the movement on a grid necessary to get from one position to another.

Students can interpret information in bar graphs, pictographs, and tables to solve simple problems. They can read and interpret different representations of the same data. For example, they can match data in pie charts and tables to bar graphs.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 2.8: Intermediate International Benchmark – Example Item 3

Country	Percent Correct	
Korea, Rep. of	97 (0.7)	▲
Japan	95 (0.9)	▲
2 Singapore	92 (1.1)	▲
Chinese Taipei	92 (1.1)	▲
Finland	86 (1.7)	▲
Belgium (Flemish)	86 (1.4)	▲
Portugal	84 (2.2)	▲
Germany	76 (1.7)	▲
Ireland	75 (2.0)	▲
† Northern Ireland	74 (2.6)	▲
1 2 Lithuania	74 (2.2)	▲
England	74 (2.4)	▲
2 United States	74 (1.8)	▲
2 Hong Kong SAR	74 (1.9)	▲
† Netherlands	73 (1.9)	▲
2 Denmark	73 (2.0)	▲
Austria	72 (2.2)	▲
Italy	69 (2.1)	▲
Malta	67 (1.9)	▲
Russian Federation	67 (1.9)	▲
Sweden	65 (2.3)	▲
Chile	64 (1.7)	▲
2 Kazakhstan	63 (2.7)	
2 Azerbaijan	62 (2.7)	
Australia	62 (2.2)	
Hungary	61 (2.4)	
International Avg.	60 (0.3)	
Slovak Republic	60 (2.5)	
Poland	59 (2.3)	
Czech Republic	59 (2.6)	
‡ Norway	59 (3.2)	
Spain	58 (2.6)	
Romania	57 (2.7)	
Turkey	56 (1.9)	▼
Slovenia	54 (2.3)	▼
2 Serbia	54 (2.0)	▼
2 Croatia	54 (2.2)	▼
New Zealand	48 (2.3)	▼
1 Georgia	48 (2.4)	▼
Bahrain	44 (2.4)	▼
Thailand	44 (1.8)	▼
2 Qatar	42 (2.6)	▼
Armenia	41 (2.2)	▼
United Arab Emirates	41 (1.2)	▼
Saudi Arabia	30 (2.5)	▼
Morocco	30 (2.2)	▼
Oman	29 (2.1)	▼
Iran, Islamic Rep. of	29 (1.9)	▼
Tunisia	28 (2.2)	▼
Yemen	19 (1.8)	▼
1 Kuwait	19 (1.8)	▼

Content Domain: Number

Cognitive Domain: Applying

Description: Solves a word problem involving addition of decimals (one place)

Duncan first traveled 4.8 km in a car and then he traveled 1.5 km in a bus.

How far did Duncan travel?

- ● 6.3 km
- Ⓑ 5.8 km
- Ⓒ 5.13 km
- Ⓓ 4.95 km

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SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Country	Percent Correct	
Sixth Grade Participants		
Botswana	62 (2.3)	
Honduras	46 (3.1)	▼
Yemen	27 (2.1)	▼

Country	Percent Correct	
Benchmarking Participants		
1 2 North Carolina, US	80 (2.8)	▲
1 3 Florida, US	72 (2.5)	▲
Quebec, Canada	69 (2.6)	▲
2 Alberta, Canada	61 (2.1)	
Ontario, Canada	57 (2.2)	
Dubai, UAE	55 (1.5)	▼
Abu Dhabi, UAE	34 (2.1)	▼

▲ Percent significantly higher than international average

▼ Percent significantly lower than international average

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

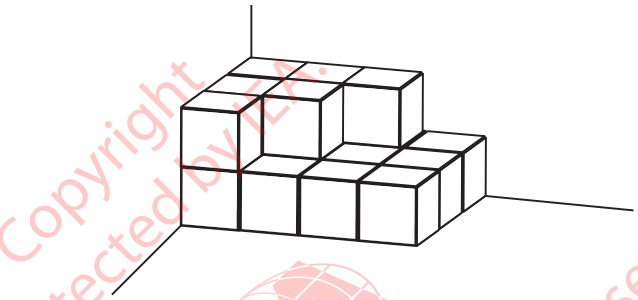
Exhibit 2.9: Intermediate International Benchmark – Example Item 4

Country	Percent Correct	
Chinese Taipei	95 (0.8)	▲
Belgium (Flemish)	90 (1.2)	▲
† Netherlands	90 (1.5)	▲
Korea, Rep. of	85 (1.3)	▲
Germany	85 (1.6)	▲
Japan	84 (1.5)	▲
Portugal	84 (1.8)	▲
Finland	81 (2.0)	▲
2 Hong Kong SAR	80 (1.7)	▲
1 2 Lithuania	78 (1.9)	▲
2 Singapore	78 (1.4)	▲
2 Denmark	77 (1.9)	▲
Czech Republic	74 (2.2)	▲
Sweden	74 (1.9)	▲
‡ Norway	74 (2.5)	▲
Australia	74 (2.2)	▲
Austria	74 (2.5)	▲
† Northern Ireland	72 (2.1)	▲
Slovenia	70 (1.9)	▲
Hungary	70 (1.9)	▲
2 Serbia	70 (2.5)	▲
2 United States	69 (1.3)	▲
Russian Federation	68 (2.1)	▲
England	67 (2.5)	
Ireland	66 (2.3)	
Slovak Republic	66 (2.2)	
New Zealand	63 (2.0)	
Poland	63 (2.4)	
International Avg.	63 (0.3)	
2 Croatia	62 (2.3)	
Chile	59 (1.9)	
Romania	57 (2.6)	▼
2 Kazakhstan	57 (2.4)	▼
Malta	57 (2.4)	▼
Spain	55 (2.5)	▼
Thailand	53 (2.5)	▼
Italy	52 (2.3)	▼
1 Georgia	51 (2.2)	▼
Bahrain	50 (2.3)	▼
Armenia	47 (2.4)	▼
2 Azerbaijan	46 (2.8)	▼
Turkey	45 (1.8)	▼
Iran, Islamic Rep. of	44 (2.0)	▼
Saudi Arabia	43 (2.9)	▼
United Arab Emirates	41 (1.3)	▼
2 Qatar	38 (2.4)	▼
Oman	33 (1.7)	▼
Tunisia	32 (2.2)	▼
Morocco	31 (2.2)	▼
1 Kuwait	31 (2.0)	▼
Yemen	31 (2.2)	▼

Content Domain: Geometric Shapes and Measures

Cognitive Domain: Applying

Description: Determines the number of cubes in a stack with some hidden



Ann stacks these boxes in the corner of the room. All the boxes are the same size. How many boxes does she use?

Ⓐ 25

Ⓑ 19

● 18

Ⓓ 13

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Country	Percent Correct	
Sixth Grade Participants		
Botswana	43 (1.9)	▼
Yemen	39 (1.8)	▼
Honduras	38 (3.2)	▼

Country	Percent Correct	
Benchmarking Participants		
Quebec, Canada	77 (1.9)	▲
2 Alberta, Canada	72 (2.3)	▲
Ontario, Canada	70 (2.3)	▲
1 3 Florida, US	68 (2.9)	
1 2 North Carolina, US	68 (3.0)	
Abu Dhabi, UAE	45 (2.6)	▼
Dubai, UAE	43 (1.4)	▼

▲ Percent significantly higher than international average

▼ Percent significantly lower than international average

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 2.10: Intermediate International Benchmark – Example Item 5

Country	Percent Correct	
Korea, Rep. of	95 (0.9)	▲
Japan	92 (1.1)	▲
2 Singapore	89 (1.0)	▲
2 Hong Kong SAR	88 (1.5)	▲
Chinese Taipei	87 (1.4)	▲
Russian Federation	86 (1.7)	▲
Finland	84 (2.1)	▲
2 United States	83 (1.1)	▲
Germany	83 (1.8)	▲
Portugal	82 (1.9)	▲
Slovenia	82 (2.0)	▲
2 Denmark	81 (1.6)	▲
Australia	81 (1.9)	▲
Italy	81 (1.9)	▲
† Netherlands	80 (2.0)	▲
Austria	79 (1.9)	▲
† Northern Ireland	78 (2.2)	▲
Slovak Republic	78 (1.9)	▲
1 2 Lithuania	77 (2.4)	▲
Belgium (Flemish)	76 (2.4)	▲
England	76 (2.0)	▲
Hungary	76 (2.1)	▲
2 Kazakhstan	76 (2.3)	▲
Chile	75 (1.8)	▲
Turkey	75 (1.4)	▲
Spain	75 (2.0)	▲
Ireland	75 (2.1)	
New Zealand	73 (1.9)	
Poland	72 (2.1)	
Czech Republic	72 (2.1)	
‡ Norway	72 (2.8)	
Sweden	71 (2.2)	
International Avg.	71 (0.3)	
Romania	71 (2.6)	
Bahrain	69 (2.1)	
Malta	69 (2.0)	
2 Serbia	69 (2.7)	
2 Croatia	66 (2.5)	
Thailand	65 (2.6)	▼
United Arab Emirates	63 (1.3)	▼
2 Qatar	61 (2.7)	▼
Saudi Arabia	61 (2.7)	▼
1 Georgia	61 (2.5)	▼
Iran, Islamic Rep. of	55 (2.6)	▼
Oman	52 (1.7)	▼
2 Azerbaijan	52 (2.8)	▼
1 Kuwait	46 (2.2)	▼
Armenia	39 (2.4)	▼
Morocco	33 (1.9)	▼
Tunisia	32 (2.2)	▼
Yemen	22 (1.8)	▼

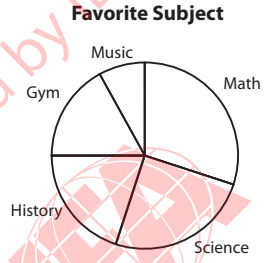
Content Domain: Data Display

Cognitive Domain: Reasoning

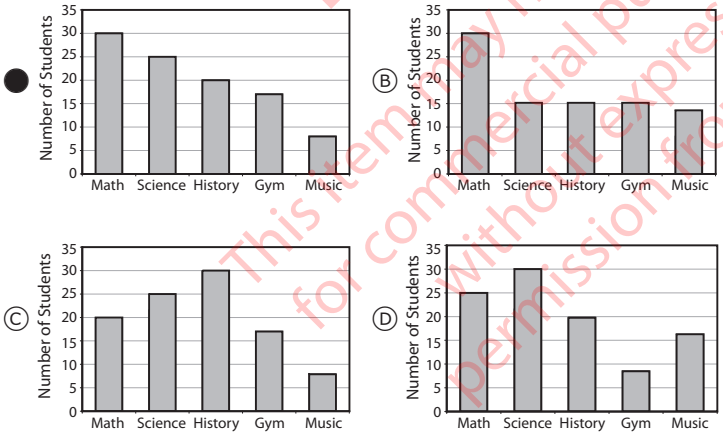
Description: Identifies the bar graph that matches the information shown in a pie chart

Mr. Johnson asked the students in his school about their favorite subject.

This pie chart shows how many students liked each of 5 subjects.



Which graph shows the same information as the pie chart?



Country	Percent Correct	
Sixth Grade Participants		
Botswana	65 (2.2)	▼
Honduras	49 (3.4)	▼
Yemen	46 (2.8)	▼

Country	Percent Correct	
Benchmarking Participants		
2 Alberta, Canada	83 (1.9)	▲
1 2 North Carolina, US	82 (2.7)	▲
1 3 Florida, US	81 (2.1)	▲
Ontario, Canada	80 (1.6)	▲
Quebec, Canada	77 (1.5)	▲
Dubai, UAE	70 (1.7)	
Abu Dhabi, UAE	59 (2.4)	▼

▲ Percent significantly higher than international average

▼ Percent significantly lower than international average

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

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Fourth Grade TIMSS 2011 High International Benchmark

Exhibit 2.11 presents the description of achievement at the High International Benchmark. The length of the description signals that students reaching this level demonstrated some competency with many of the topics in the framework. For example, their skills in number included solving problems involving two-digit numbers, division, and proportional reasoning. They could solve a variety of problems involving symmetry. In addition, they could interpret and use data in tables and graphs to solve problems.

Example Item 6 shown in Exhibit 2.12 illustrates the growing facility in the number domain demonstrated by students at the High Benchmark. This is a word problem set in a real life context and involving measurements—specifically, the addition of time. This word problem was solved correctly by 52 percent of the students internationally, on average.

Exhibit 2.13 presents Example Item 7, a constructed response item from the geometric shapes domain assessing understanding of symmetry. Students were given three sides of the shape on the grid and asked to finish drawing the shape according to the specifications. Internationally, on average, 42 percent of the students successfully completed a five-sided symmetrical shape. The top performance was in Hong Kong SAR, where 84 percent of the students could do this problem; but the next highest achievement was in Korea with two-thirds answering successfully.

Example Item 8 shown in Exhibit 2.14 is an example of a data display problem likely to be answered correctly by students reaching the High Benchmark. Because students needed to read the problem and the graph, and devise a strategy for using the information in the graph to answer the question, this item was classified as multi-step reasoning problem. Internationally, on average, 54 percent of the students answered correctly.

○ High International Benchmark

550

Summary

Students can apply their knowledge and understanding to solve problems. Students can solve word problems involving operations with whole numbers. They can use division in a variety of problem situations. They can use their understanding of place value to solve problems. Students can extend patterns to find a later specified term. Students demonstrate understanding of line symmetry and geometric properties. Students can interpret and use data in tables and graphs to solve problems. They can use information in pictographs and tally charts to complete bar graphs.

Students at this level can solve word problems involving operations with whole numbers. They can multiply two-digit numbers and use division in a variety of problem situations. They can use their understanding of place value to solve problems. For example, they can identify the missing digit in a number given its place value, the sum closest to a given value, and appropriately rounded numbers. They show some understanding of multiples and factors.

Students can read unlabelled gradations on a scale and solve a word problem involving measures and proportional reasoning. They can solve word problems involving addition of time. They can add two-place decimals and order unit fractions. They can write a number between two consecutive whole numbers. Students can extend patterns to find a later specified term and use two-step rules to continue a pattern.

Students demonstrate understanding of line symmetry. For example, they can draw lines of symmetry, reflect shapes across a line of symmetry and identify symmetrical shapes. They can classify shapes according to given properties. They can recognize right angles, parallel, and perpendicular lines in different orientations. They can find perimeters of simple figures. They can recognize a net of a cube and the stack of cubes with largest volume.

Students can interpret and use data in tables and graphs to solve problems. For example, they can compare data from two sources to draw conclusions. They can use information in pictographs and tally charts to complete bar graphs.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 2.12: High International Benchmark – Example Item 6

Country	Percent Correct	
Chinese Taipei	85 (1.5)	▲
Korea, Rep. of	82 (1.8)	▲
2 Singapore	82 (1.4)	▲
2 Hong Kong SAR	76 (2.0)	▲
† Netherlands	73 (2.2)	▲
† Northern Ireland	73 (2.3)	▲
Japan	69 (1.8)	▲
Czech Republic	69 (2.5)	▲
1 2 Lithuania	67 (2.0)	▲
Poland	67 (2.0)	▲
Germany	65 (2.1)	▲
Russian Federation	65 (1.8)	▲
Finland	65 (2.4)	▲
Belgium (Flemish)	63 (2.3)	▲
England	63 (2.6)	▲
Sweden	62 (2.2)	▲
2 Serbia	60 (2.8)	▲
2 Denmark	60 (2.7)	▲
Slovak Republic	58 (3.0)	▲
Hungary	57 (2.3)	▲
2 United States	57 (1.5)	▲
‡ Norway	55 (3.2)	
Ireland	54 (3.2)	
Slovenia	54 (2.1)	
2 Azerbaijan	52 (3.2)	
Austria	52 (2.4)	
International Avg.	52 (0.3)	
Australia	51 (2.4)	
2 Croatia	49 (2.1)	
New Zealand	49 (2.1)	
Romania	48 (2.3)	
Portugal	47 (2.9)	
2 Kazakhstan	47 (2.9)	
Turkey	46 (2.0)	▼
Italy	45 (2.3)	▼
Armenia	43 (2.3)	▼
Malta	41 (2.2)	▼
Thailand	41 (2.7)	▼
Chile	40 (1.9)	▼
1 Georgia	37 (2.3)	▼
Spain	34 (2.1)	▼
Tunisia	33 (1.9)	▼
Iran, Islamic Rep. of	33 (2.3)	▼
United Arab Emirates	32 (1.2)	▼
2 Qatar	30 (1.8)	▼
Yemen	29 (1.9)	▼
Saudi Arabia	26 (2.1)	▼
Bahrain	25 (2.0)	▼
Morocco	24 (2.4)	▼
1 Kuwait	23 (1.7)	▼
Oman	21 (1.3)	▼

Content Domain: Number

Cognitive Domain: Applying

Description: Solves a word problem involving addition of time and conversion between hours and minutes

A train left Redville at 8:45 a.m. It arrived in Bedford 2 hours and 18 minutes later. What time did it arrive in Bedford?

Ⓐ 11:15 a.m.

Ⓑ 11:13 a.m.

● 11:03 a.m.

Ⓓ 10:53 a.m.

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Country	Percent Correct	
Sixth Grade Participants		
Honduras	25 (2.7)	▼
Yemen	25 (2.0)	▼
Botswana	23 (2.0)	▼

Country	Percent Correct	
Benchmarking Participants		
1 2 North Carolina, US	66 (2.8)	▲
1 3 Florida, US	54 (2.9)	
Quebec, Canada	54 (2.4)	
Ontario, Canada	53 (2.6)	
2 Alberta, Canada	51 (2.5)	
Dubai, UAE	42 (1.9)	▼
Abu Dhabi, UAE	30 (2.0)	▼

▲ Percent significantly higher than international average

▼ Percent significantly lower than international average

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 2.13: High International Benchmark – Example Item 7

Country	Percent Full Credit	
[2] Hong Kong SAR	84 (2.0)	▲
Korea, Rep. of	67 (1.8)	▲
England	61 (2.6)	▲
[2] Singapore	61 (2.0)	▲
Russian Federation	61 (2.7)	▲
[2] Denmark	57 (2.2)	▲
[2] Kazakhstan	55 (2.6)	▲
Slovenia	55 (2.3)	▲
† Northern Ireland	53 (2.3)	▲
Portugal	53 (3.4)	▲
Belgium (Flemish)	52 (2.5)	▲
[1 2] Lithuania	52 (2.4)	▲
[2] United States	51 (1.6)	▲
Italy	50 (2.5)	▲
Australia	50 (2.0)	▲
Slovak Republic	47 (2.1)	▲
Ireland	47 (2.6)	
[1] Georgia	46 (2.7)	
Sweden	45 (2.8)	
Finland	45 (2.5)	
[2] Azerbaijan	45 (3.2)	
Chinese Taipei	44 (2.0)	
Germany	44 (2.2)	
Malta	44 (2.2)	
Czech Republic	43 (2.6)	
Romania	42 (2.6)	
Hungary	42 (2.5)	
International Avg.	42 (0.3)	
New Zealand	42 (2.1)	
Armenia	41 (2.8)	
Spain	41 (2.7)	
Iran, Islamic Rep. of	40 (2.3)	
Japan	39 (1.9)	
Poland	39 (1.9)	
‡ Norway	38 (2.6)	
Chile	38 (2.0)	▼
Thailand	37 (2.6)	▼
Bahrain	31 (3.3)	▼
[2] Serbia	31 (2.5)	▼
Oman	31 (1.7)	▼
[2] Croatia	29 (1.9)	▼
United Arab Emirates	29 (1.2)	▼
† Netherlands	29 (2.3)	▼
Saudi Arabia	29 (2.7)	▼
Austria	26 (2.1)	▼
[2] Qatar	26 (2.3)	▼
Turkey	26 (1.7)	▼
Morocco	23 (2.0)	▼
Tunisia	19 (1.8)	▼
[1] Kuwait	17 (1.7)	▼
Yemen	5 (1.1)	▼

Content Domain: Geometric Shapes and Measures

Cognitive Domain: Applying

Description: Completes a shape so that it has line symmetry and a given number of sides

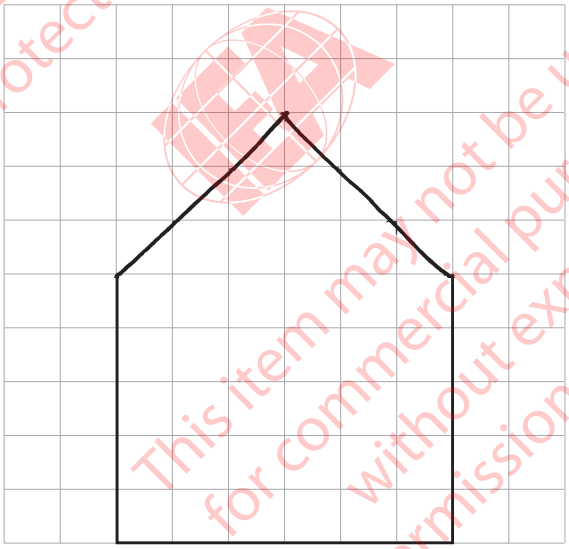
Jay has to draw a shape.

It must have 5 sides.

It must have one line of symmetry.

Jay has started to draw the shape.

Complete Jay's shape.



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The answer shown illustrates the type of student response that was given 1 of 1 points.

Country	Percent Full Credit	
Sixth Grade Participants		
Honduras	35 (2.7)	▼
Botswana	28 (2.2)	▼
Yemen	16 (1.8)	▼

Country	Percent Full Credit	
Benchmarking Participants		
Quebec, Canada	59 (2.5)	▲
Ontario, Canada	52 (2.5)	▲
[1 3] Florida, US	50 (3.4)	▲
[1 2] North Carolina, US	50 (3.0)	▲
[2] Alberta, Canada	37 (2.5)	
Dubai, UAE	36 (1.8)	▼
Abu Dhabi, UAE	26 (2.1)	▼

▲ Percent significantly higher than international average

▼ Percent significantly lower than international average

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

TIMSS & PIRLS International Study Center Lynch School of Education, Boston College

Exhibit 2.14: High International Benchmark – Example Item 8

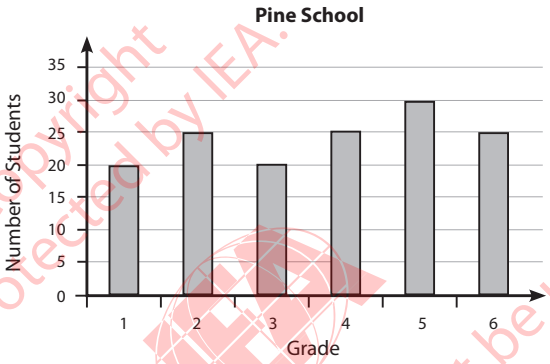
Country	Percent Correct	
Chinese Taipei	79 (1.9)	▲
2 Hong Kong SAR	78 (2.0)	▲
Korea, Rep. of	75 (1.3)	▲
† Netherlands	74 (2.1)	▲
2 Singapore	73 (1.8)	▲
Japan	71 (2.0)	▲
Portugal	70 (2.8)	▲
‡ Norway	67 (2.3)	▲
Germany	67 (2.0)	▲
2 Denmark	66 (2.0)	▲
England	65 (2.5)	▲
Sweden	64 (2.4)	▲
1 2 Lithuania	64 (2.1)	▲
Ireland	64 (2.5)	▲
Slovenia	64 (1.9)	▲
Finland	63 (2.1)	▲
2 United States	63 (1.5)	▲
Belgium (Flemish)	62 (2.2)	▲
New Zealand	60 (2.1)	▲
† Northern Ireland	59 (2.9)	
2 Serbia	59 (2.4)	▲
Australia	58 (2.1)	
Austria	57 (2.5)	
1 Georgia	55 (2.3)	
International Avg.	54 (0.3)	
Russian Federation	53 (2.4)	
Malta	52 (2.4)	
2 Croatia	51 (2.1)	
Poland	51 (2.5)	
Slovak Republic	50 (2.1)	
Spain	50 (2.5)	
Turkey	50 (2.0)	▼
Chile	50 (2.0)	▼
Italy	49 (2.4)	▼
Romania	48 (2.7)	▼
2 Kazakhstan	47 (2.1)	▼
Hungary	47 (2.1)	▼
Thailand	46 (2.6)	▼
Czech Republic	45 (2.7)	▼
Iran, Islamic Rep. of	44 (1.8)	▼
United Arab Emirates	41 (1.3)	▼
2 Qatar	41 (2.5)	▼
Bahrain	39 (2.4)	▼
Saudi Arabia	38 (2.3)	▼
Oman	33 (1.7)	▼
Armenia	29 (2.2)	▼
Morocco	29 (1.8)	▼
Yemen	29 (2.2)	▼
1 Kuwait	26 (2.0)	▼
Tunisia	26 (1.9)	▼
2 Azerbaijan	– –	

Content Domain: Data Display

Cognitive Domain: Reasoning

Description: Solves a multi-step reasoning problem using data from a bar graph

The graph shows the number of students at each grade in the Pine School.



In the Pine School there is room in each grade for 30 students.
How many more students could be in the school?

Ⓐ 20
Ⓑ 25
Ⓒ 30
● 35

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Country	Percent Correct	
Sixth Grade Participants		
Honduras	47 (2.7)	▼
Yemen	45 (2.4)	▼
Botswana	41 (2.2)	▼

Country	Percent Correct	
Benchmarking Participants		
1 2 North Carolina, US	61 (2.9)	▲
2 Alberta, Canada	60 (2.3)	▲
Ontario, Canada	58 (2.3)	
1 3 Florida, US	56 (2.4)	
Dubai, UAE	48 (2.2)	▼
Quebec, Canada	46 (2.7)	▼
Abu Dhabi, UAE	37 (2.6)	▼

▲ Percent significantly higher than international average
▼ Percent significantly lower than international average

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡.
() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Fourth Grade TIMSS 2011 Advanced International Benchmark

Exhibit 2.15 describes fourth grade performance at the Advanced International Benchmark. Students reaching this level demonstrated facility with many of the topics in the TIMSS 2011 Mathematics Framework. They typically demonstrated success on the knowledge and skills represented by this benchmark, as well as those demonstrated at the High, Intermediate, and Low Benchmarks. They could solve a variety of multi-step word problems involving whole numbers and demonstrated an increasing understanding of fractions and decimals. Students could apply geometric knowledge about a range of shapes and solve problems involving area and perimeter. Finally, they could explain their reasoning, and organize, interpret, and represent data to solve two-step problems.

Example Item 9 in Exhibit 2.16 shows an example of the types of items students at the Advanced International Benchmark could answer correctly. This constructed-response multi-step numerical reasoning problem was answered successfully by 27 percent of the students internationally, on average. It is interesting to note that the five top-performing East Asian countries had the highest achievement on this reasoning item, with approximately half of their students able to provide the correct answer.

Example Item 10 in Exhibit 2.17 shows a constructed-response item in a somewhat different format. To demonstrate their understanding of various geometric properties, students needed to answer the series of questions correctly. They needed to be able to visualize the two solids and apply their understanding of geometric terms such as square, face, and right angle. Internationally, on average, only one-third of the fourth grade students were able to do so.

Advanced International Benchmark

625

Summary

Students can apply their understanding and knowledge in a variety of relatively complex situations and explain their reasoning. They can solve a variety of multi-step word problems involving whole numbers, including proportions. Students at this level show an increasing understanding of fractions and decimals. Students can apply geometric knowledge of a range of two- and three-dimensional shapes in a variety of situations. They can draw a conclusion from data in a table and justify their conclusion.

Students can solve a variety of multi-step word problems involving whole numbers. They can solve proportion problems and number sentences involving whole numbers. Students at this level show an increasing understanding of fractions and decimals. They can determine equivalent fractions represented in a variety of ways. Given a fraction, they can identify a larger fraction with a different denominator. They can identify the smallest among a set of one- and two-place decimals and use their knowledge of decimals to solve two-step problems. They can identify a two-step rule for a linear relationship between the first and second numbers in a set of ordered pairs.

Students can apply geometric knowledge of a range of two- and three-dimensional shapes in a variety of situations. They can estimate the length of a curved line. Students can use their knowledge of perimeter to solve a multi-step problem. Students can determine the areas of simple figures. For example, they can find the area of a figure composed of squares and half squares, determine the area of an isosceles triangle on a grid, and calculate the area of a rectangle. Students can determine the number of cubes that fill a given rectangular box.

Students can organize, interpret, and represent data to solve two-step problems. They can draw a conclusion from data in a table and justify their conclusion.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 2.16: Advanced International Benchmark – Example Item 9

Country	Percent Full Credit
[2] Hong Kong SAR	59 (2.2) ▲
Japan	56 (2.2) ▲
Korea, Rep. of	52 (2.0) ▲
[2] Singapore	52 (1.9) ▲
Chinese Taipei	48 (2.1) ▲
England	47 (2.3) ▲
† Northern Ireland	45 (2.7) ▲
[2] Serbia	45 (2.4) ▲
Czech Republic	41 (2.7) ▲
[2] Denmark	40 (2.1) ▲
Portugal	40 (2.4) ▲
Ireland	39 (2.3) ▲
[1 2] Lithuania	37 (2.6) ▲
Sweden	36 (2.6) ▲
† Netherlands	36 (2.3) ▲
Finland	35 (2.2) ▲
[2] United States	34 (1.5) ▲
Slovak Republic	34 (2.2) ▲
Australia	31 (1.9) ▲
Germany	29 (1.9)
Russian Federation	28 (2.0)
International Avg.	27 (0.3)
[2] Azerbaijan	26 (2.7)
New Zealand	26 (1.8)
Romania	26 (2.5)
Turkey	26 (1.6)
Hungary	26 (1.7)
Belgium (Flemish)	25 (1.8)
[2] Kazakhstan	25 (2.3)
[2] Croatia	25 (2.1)
Armenia	25 (2.5)
Italy	23 (2.2)
Poland	22 (1.7) ▼
Spain	21 (1.8) ▼
Malta	21 (1.6) ▼
Slovenia	21 (1.9) ▼
Thailand	20 (2.1) ▼
‡ Norway	19 (2.0) ▼
Austria	17 (1.6) ▼
Chile	16 (1.5) ▼
[1] Georgia	14 (2.2) ▼
Saudi Arabia	13 (2.1) ▼
Morocco	13 (1.5) ▼
United Arab Emirates	12 (0.8) ▼
Bahrain	11 (1.6) ▼
Iran, Islamic Rep. of	9 (1.0) ▼
[2] Qatar	8 (1.7) ▼
Oman	5 (0.8) ▼
Tunisia	4 (0.7) ▼
Yemen	3 (0.7) ▼
[1] Kuwait	2 (0.6) ▼

Content Domain: Number

Cognitive Domain: Reasoning

Description: Solves a multi-step numerical reasoning problem

In a soccer tournament, teams get:

3 points for a win
1 point for a tie
0 points for a loss

Zedland has 11 points.

What is the **smallest** number of games Zedland could have played?

Answer: 5

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The answer shown illustrates the type of student response that was given 1 of 1 points.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Country	Percent Full Credit
Sixth Grade Participants	
Honduras	10 (1.9) ▼
Yemen	9 (1.6) ▼
Botswana	7 (1.4) ▼

Country	Percent Full Credit
Benchmarking Participants	
[1 2] North Carolina, US	39 (3.2) ▲
Ontario, Canada	36 (2.5) ▲
[1 3] Florida, US	35 (3.1) ▲
[2] Alberta, Canada	35 (2.3) ▲
Quebec, Canada	26 (2.7)
Dubai, UAE	14 (1.1) ▼
Abu Dhabi, UAE	11 (1.7) ▼

▲ Percent significantly higher than international average

▼ Percent significantly lower than international average

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡.
() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Exhibit 2.17: Advanced International Benchmark – Example Item 10

Country	Percent Full Credit	
Portugal	70 (2.1)	▲
Austria	67 (2.4)	▲
† Northern Ireland	58 (2.6)	▲
England	58 (2.4)	▲
2 Hong Kong SAR	57 (2.3)	▲
Chinese Taipei	53 (2.4)	▲
Japan	53 (2.0)	▲
2 United States	50 (1.4)	▲
2 Denmark	47 (2.0)	▲
Australia	45 (2.2)	▲
Ireland	45 (2.6)	▲
Germany	44 (2.5)	▲
Korea, Rep. of	44 (2.1)	▲
Italy	44 (2.1)	▲
Hungary	42 (2.0)	▲
Belgium (Flemish)	42 (2.3)	▲
Poland	42 (2.1)	▲
Chile	41 (2.1)	▲
2 Singapore	41 (2.2)	▲
Malta	40 (2.2)	▲
Slovenia	39 (2.3)	▲
2 Croatia	35 (1.9)	
1 2 Lithuania	34 (2.5)	
Finland	33 (2.7)	
International Avg.	32 (0.3)	
New Zealand	32 (1.9)	
Romania	32 (2.8)	
2 Serbia	28 (2.1)	▼
2 Qatar	27 (2.0)	▼
2 Kazakhstan	27 (2.6)	▼
Spain	26 (2.4)	▼
United Arab Emirates	26 (1.2)	▼
‡ Norway	26 (2.7)	▼
Oman	26 (1.5)	▼
Russian Federation	22 (1.8)	▼
Sweden	20 (1.9)	▼
† Netherlands	20 (2.0)	▼
1 Kuwait	20 (1.9)	▼
Slovak Republic	19 (1.7)	▼
Czech Republic	18 (1.9)	▼
Armenia	16 (1.9)	▼
Iran, Islamic Rep. of	15 (1.2)	▼
1 Georgia	15 (1.7)	▼
Bahrain	13 (1.8)	▼
Tunisia	11 (1.5)	▼
Saudi Arabia	11 (1.5)	▼
2 Azerbaijan	6 (1.2)	▼
Thailand	6 (1.3)	▼
Turkey	4 (1.1)	▼
Yemen	1 (0.5)	▼
Morocco	– –	

Content Domain: Geometric Shapes and Measures

Cognitive Domain: Knowing

Description: Given the pictures of two common solids, classifies four statements as true or false

Figure A

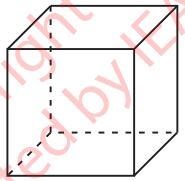
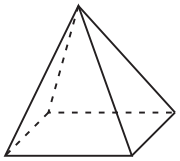


Figure B



Here are some statements about Figure A and Figure B. Put an X to show whether each statement is true or false.

Statement	True	False
A and B both have a square face.	X	
A and B both have the same number of faces.		X
All the angles in A are right angles.	X	
B has more edges than A.		X
Some of the edges in B are curved.		X

The answer shown illustrates the type of student response that was given 2 of 2 points.

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Country	Percent Full Credit	
Sixth Grade Participants		
Botswana	19 (1.7)	▼
Honduras	12 (1.6)	▼
Yemen	5 (1.0)	▼

Country	Percent Full Credit	
Benchmarking Participants		
Quebec, Canada	57 (2.5)	▲
Ontario, Canada	46 (2.1)	▲
1 2 North Carolina, US	46 (3.2)	▲
1 3 Florida, US	44 (2.7)	▲
Dubai, UAE	29 (1.7)	
2 Alberta, Canada	29 (2.1)	
Abu Dhabi, UAE	22 (2.0)	▼

▲ Percent significantly higher than international average

▼ Percent significantly lower than international average

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A dash (–) indicates comparable data not available.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Eighth Grade Results for the TIMSS International Benchmarks in Mathematics

Eighth Grade Achievement at the TIMSS 2011 International Benchmarks of Mathematics Achievement

Exhibit 2.18 provides an overview of eighth grade achievement at the TIMSS 2011 International Benchmarks. The next sections of the chapter contain detailed descriptions of each level accompanied with example items. The top and bottom of the scale differentiates between those advanced eighth grade students who have a solid foundation across the TIMSS mathematics topics including algebra, compared to those at the low end with mathematics understanding in closer alignment to the TIMSS fourth grade topics.

Students at the Advanced International Benchmark can reason with information and make generalizations. In number, they can solve a variety of fraction, percent, and proportion problems, and in algebra they can solve problems involving equations, formulas, and functions. They also can reason with geometric figures and data from several sources to solve multi-step problems. In contrast, students at the Low International Benchmark have some knowledge of whole number and decimals, operations, and basic graphs.

Eighth Grade Achievement at the TIMSS 2011 International Benchmarks of Mathematics Achievement

Exhibit 2.19 presents the percentage of students reaching each TIMSS 2011 International Benchmark. The results are presented in descending order according to the percentage of students reaching the Advanced International Benchmark, first for countries that tested eighth-grade students, and then for ninth-grade students and benchmarking participants on the following page. The percentage of students reaching the Advanced Benchmark is indicated in the bar graph with a black dot. Because students who reached the Advanced Benchmark also reached the other benchmarks, the percentages shown in the graphic and in the data columns to the right are cumulative.

At the eighth grade, clearly the East Asian countries, particularly, Chinese Taipei, Singapore, and Korea, are pulling away from the rest of the world in mathematics achievement by a considerable margin.

Capitalizing on the head start demonstrated by their fourth grade students, the five East Asian countries had the largest percentages of eighth grade students reaching the Advanced International Benchmark. Very impressively, Chinese Taipei, Singapore, and Korea had nearly half their students (47–49%) reach

Exhibit 2.18: TIMSS 2011 International Benchmarks of Mathematics Achievement

Advanced International Benchmark

625

Students can reason with information, draw conclusions, make generalizations, and solve linear equations. Students can solve a variety of fraction, proportion, and percent problems and justify their conclusions. Students can express generalizations algebraically and model situations. They can solve a variety of problems involving equations, formulas, and functions. Students can reason with geometric figures to solve problems. Students can reason with data from several sources or unfamiliar representations to solve multi-step problems.

High International Benchmark

550

Students can apply their understanding and knowledge in a variety of relatively complex situations. Students can use information from several sources to solve problems involving different types of numbers and operations. Students can relate fractions, decimals, and percents to each other. Students at this level show basic procedural knowledge related to algebraic expressions. They can use properties of lines, angles, triangles, rectangles, and rectangular prisms to solve problems. They can analyze data in a variety of graphs.

Intermediate International Benchmark

475

Students can apply basic mathematical knowledge in a variety of situations. Students can solve problems involving decimals, fractions, proportions, and percentages. They understand simple algebraic relationships. Students can relate a two-dimensional drawing to a three-dimensional object. They can read, interpret, and construct graphs and tables. They recognize basic notions of likelihood.

Low International Benchmark

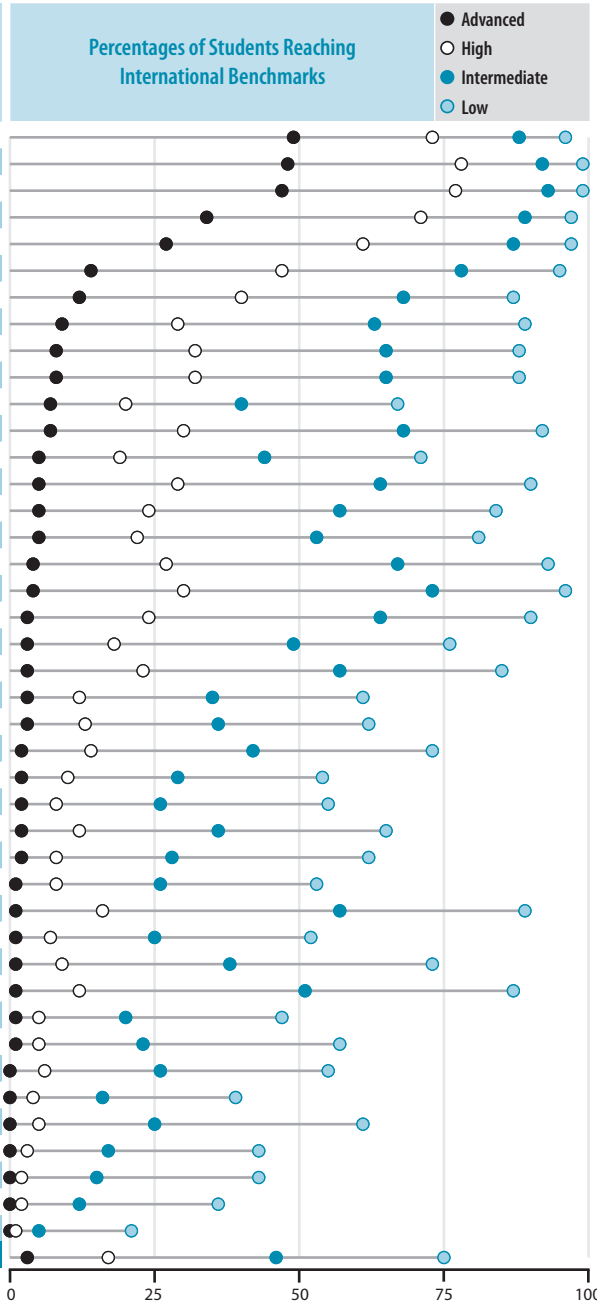
400

Students have some knowledge of whole numbers and decimals, operations, and basic graphs.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 2.19: Performance at the International Benchmarks of Mathematics Achievement

TIMSS 2011 Mathematics 8th Grade



Country	Advanced Benchmark (625)	High Benchmark (550)	Intermediate Benchmark (475)	Low Benchmark (400)
Chinese Taipei	49 (1.5)	73 (1.0)	88 (0.7)	96 (0.4)
[2] Singapore	48 (2.0)	78 (1.8)	92 (1.1)	99 (0.3)
Korea, Rep. of	47 (1.6)	77 (0.9)	93 (0.6)	99 (0.2)
Hong Kong SAR	34 (2.0)	71 (1.7)	89 (1.4)	97 (0.8)
Japan	27 (1.3)	61 (1.3)	87 (0.7)	97 (0.3)
[2] Russian Federation	14 (1.2)	47 (2.0)	78 (1.4)	95 (0.7)
[3] Israel	12 (1.2)	40 (1.7)	68 (1.8)	87 (1.2)
Australia	9 (1.7)	29 (2.6)	63 (2.4)	89 (1.1)
‡ England	8 (1.4)	32 (2.9)	65 (2.7)	88 (1.6)
Hungary	8 (0.7)	32 (1.4)	65 (1.6)	88 (1.2)
Turkey	7 (0.9)	20 (1.2)	40 (1.5)	67 (1.3)
[2] United States	7 (0.8)	30 (1.4)	68 (1.3)	92 (0.7)
Romania	5 (0.8)	19 (1.3)	44 (1.7)	71 (1.5)
[1] Lithuania	5 (0.6)	29 (1.3)	64 (1.4)	90 (0.7)
New Zealand	5 (0.8)	24 (2.6)	57 (2.8)	84 (1.6)
Ukraine	5 (0.6)	22 (1.6)	53 (2.0)	81 (1.4)
Slovenia	4 (0.4)	27 (1.2)	67 (1.4)	93 (0.7)
Finland	4 (0.5)	30 (1.5)	73 (1.5)	96 (0.6)
Italy	3 (0.5)	24 (1.1)	64 (1.4)	90 (1.1)
Armenia	3 (0.4)	18 (0.9)	49 (1.4)	76 (1.2)
Kazakhstan	3 (0.7)	23 (1.8)	57 (2.1)	85 (1.3)
Ψ Macedonia, Rep. of	3 (0.6)	12 (1.3)	35 (1.9)	61 (1.9)
[1] Georgia	3 (0.3)	13 (1.0)	36 (1.5)	62 (1.6)
United Arab Emirates	2 (0.2)	14 (0.7)	42 (1.1)	73 (0.9)
Ψ Qatar	2 (0.3)	10 (0.8)	29 (1.2)	54 (1.4)
Ψ Iran, Islamic Rep. of	2 (0.5)	8 (1.1)	26 (1.6)	55 (1.8)
Malaysia	2 (0.4)	12 (1.5)	36 (2.4)	65 (2.5)
Thailand	2 (0.4)	8 (1.3)	28 (1.9)	62 (2.1)
Ψ Bahrain	1 (0.2)	8 (0.7)	26 (0.7)	53 (0.8)
Sweden	1 (0.3)	16 (0.9)	57 (1.1)	89 (0.7)
Ψ Palestinian Nat'l Auth.	1 (0.3)	7 (0.7)	25 (1.3)	52 (1.5)
Lebanon	1 (0.2)	9 (1.0)	38 (2.2)	73 (1.9)
Norway	1 (0.2)	12 (0.9)	51 (1.6)	87 (1.3)
Ψ Saudi Arabia	1 (0.2)	5 (0.8)	20 (1.7)	47 (2.0)
Chile	1 (0.2)	5 (0.6)	23 (1.1)	57 (1.6)
Ψ Jordan	0 (0.1)	6 (0.5)	26 (1.2)	55 (1.7)
Ψ Oman	0 (0.1)	4 (0.3)	16 (0.6)	39 (1.1)
Tunisia	0 (0.2)	5 (0.9)	25 (1.4)	61 (1.3)
Ψ Syrian Arab Republic	0 (0.1)	3 (0.5)	17 (1.4)	43 (1.9)
Ψ Indonesia	0 (0.1)	2 (0.5)	15 (1.2)	43 (2.1)
Ж Morocco	0 (0.0)	2 (0.2)	12 (0.5)	36 (1.0)
Ж Ghana	0 (0.0)	1 (0.2)	5 (0.8)	21 (1.8)
International Median	3	17	46	75

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Ж Average achievement not reliably measured because the percentage of students with achievement too low for estimation exceeds 25%.

Ψ Reservations about reliability of average achievement because the percentage of students with achievement too low for estimation is less than 25% but exceeds 15%.

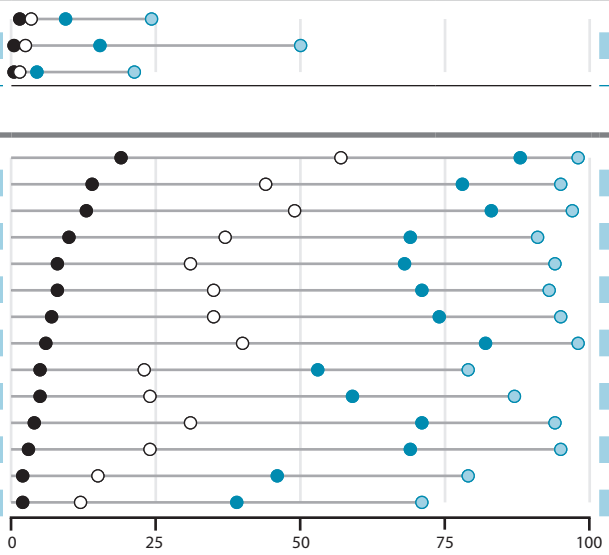
See Appendix C.3 for target population coverage notes 1, 2, and 3. See Appendix C.9 for sampling guidelines and sampling participation notes †, ‡, and ‡.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Exhibit 2.19: Performance at the International Benchmarks of Mathematics Achievement (Continued)

TIMSS 2011 Mathematics 8th Grade

Country	Percentages of Students Reaching International Benchmarks (Advanced, High, Intermediate, Low)	Advanced Benchmark (625)	High Benchmark (550)	Intermediate Benchmark (475)	Low Benchmark (400)
Ninth Grade Participants					
✳ South Africa		1 (0.1)	3 (0.4)	9 (0.7)	24 (1.0)
Ψ Botswana		0 (0.1)	2 (0.5)	15 (1.0)	50 (1.4)
2 ✳ Honduras		0 (0.0)	1 (0.3)	4 (0.9)	21 (1.7)
Benchmarking Participants					
1 2 Massachusetts, US		19 (3.0)	57 (3.2)	88 (1.4)	98 (0.3)
1 3 North Carolina, US		14 (2.6)	44 (3.6)	78 (2.5)	95 (1.3)
1 Minnesota, US		13 (2.3)	49 (2.8)	83 (1.9)	97 (0.7)
1 2 Connecticut, US		10 (1.3)	37 (2.9)	69 (2.5)	91 (1.4)
1 2 Florida, US		8 (1.6)	31 (3.2)	68 (3.3)	94 (1.3)
1 Colorado, US		8 (1.1)	35 (2.7)	71 (2.5)	93 (1.1)
1 2 Indiana, US		7 (1.2)	35 (3.3)	74 (2.3)	95 (1.0)
Quebec, Canada		6 (0.6)	40 (1.8)	82 (1.3)	98 (0.4)
Dubai, UAE		5 (0.7)	23 (1.2)	53 (1.0)	79 (0.8)
1 2 California, US		5 (0.9)	24 (2.5)	59 (2.8)	87 (1.7)
2 Ontario, Canada		4 (0.6)	31 (1.4)	71 (1.4)	94 (0.7)
2 Alberta, Canada		3 (0.5)	24 (1.3)	69 (1.6)	95 (0.7)
1 Alabama, US		2 (0.8)	15 (2.5)	46 (3.1)	79 (2.2)
Abu Dhabi, UAE		2 (0.5)	12 (1.2)	39 (1.8)	71 (1.5)



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

the Advanced International Benchmark. Hong Kong SAR had about one-third of students (34%) reach the Advanced Benchmark and Japan had about one-fourth (27%). Next, the Russian Federation and Israel had 12 to 14 percent, and the remaining countries all had less than 10 percent of their students reaching the Advanced Benchmark. Several of the US benchmarking states did have from 10–19 percent of students reaching the Advanced Benchmark, including Massachusetts, North Carolina, Minnesota, and Connecticut.

Exhibit 2.19 also provides useful information about the distribution of achievement in each country. For example, some countries such as Turkey are doing relatively better at the top end of the distribution, with 7 percent reaching the Advanced Benchmark, although only 67 percent reached the Low Benchmark. In comparison, Slovenia, Finland, and Italy had only 3 to 4 percent reaching the Advanced Benchmark but nearly all students (at least 90%) reaching the low level.

As a point of reference, Exhibit 2.19 provides the median at the eighth grade for each of the benchmarks at the bottom of each of the four right hand columns. By definition, half of the countries will have a percentage in the column above the median and half will be below the median. The median percentages of students reaching the International Benchmarks were as follows: Advanced–3 percent, High–17 percent, Intermediate–46 percent, and Low–75 percent. In comparison, at the fourth grade, the median percentage for the Low International Benchmark was 90 percent. Compared to fourth grade, more eighth grade students were being "left behind" their classmates. That is, except in the top-five countries and several other countries (the Russian Federation, the United States, Slovenia, Lithuania, Finland, and Italy), more than 10 percent of the students did not reach the Low Benchmark, which is characterized as similar to the TIMSS fourth grade topics.

Eighth Grade Trends in Performance at the TIMSS 2011 International Benchmarks of Mathematics Achievement

Exhibit 2.20 shows the changes in percentages of eighth grade students reaching the benchmarks for countries and benchmarking participants that also participated in TIMSS 1995, 1999, 2003, and/or 2007. An up arrow indicates that the percentage of students reaching a benchmark is higher in 2011 than the past cycle, and a down arrow indicates that the percentage is lower in 2011. The patterns in this exhibit generally mirror the trends in average achievement discussed in Chapter 1, and can provide further information about countries' improvement or decline over time.

Three countries improved since 1995 at all four benchmarks, including Korea, the United States, and Lithuania. The Russian Federation and Iran had gains at the two highest levels and Slovenia improved at the two lower levels. A number of other countries have shown improvements since 2007 at all four levels, including Singapore, the Russian Federation, Ukraine, Georgia, Bahrain, and the Palestinian National Authority. Tunisia improved at the three top levels between 2007 and 2011, and also Italy improved at three levels (all except advanced). There were also three countries that declined since 1995 at all four benchmarks: Hungary, Sweden, and Norway. Singapore and Japan declined at all except the Advanced Benchmark and Romania and New Zealand at the two lower benchmarks. Some countries had recent declines since 2007, including Jordan at all four levels, Sweden at all except the low level, Malaysia at all except the advanced level, and Thailand and Indonesia at the two middle levels.

Exhibit 2.20: Trends in Percentages of Students Reaching the International Benchmarks of Mathematics Achievement

TIMSS 2011 Mathematics 8th Grade

Country	Advanced International Benchmark (625)					High International Benchmark (550)				
	Percent of Students					Percent of Students				
	2011	2007	2003	1999	1995	2011	2007	2003	1999	1995
Chinese Taipei	49	45	38 ▲	37 ▲		73	71	66 ▲	67 ▲	
Singapore	48	40 ▲	44	42	40 ▲	78	70 ▲	77	77	84 ▼
Korea, Rep. of	47	40 ▲	35 ▲	32 ▲	31 ▲	77	71 ▲	70 ▲	70 ▲	67 ▲
Hong Kong SAR	34	31	31	28 ▲	23 ▲	71	64 ▲	73	70	65
Japan	27	26	24	29	29	61	61	62	66 ▼	67 ▼
Russian Federation	14	8 ▲	6 ▲	12	9 ▲	47	33 ▲	30 ▲	39 ▲	38 ▲
Australia	9	6	7		7	29	24	29		33
England	8	8	5	6	6	32	35	26	25	27
Hungary	8	10	11 ▼	13 ▼	10 ▼	32	36	41 ▼	43 ▼	40 ▼
United States	7	6	7	7	4 ▲	30	31	29	30	26 ▲
Romania	5	4	4	4	4	19	20	21	20	21
Lithuania	5	6	5	3 ▲	2 ▲	29	30	28	18 ▲	17 ▲
New Zealand	5		5	6	6	24		24	26	28
Ukraine	5	3 ▲				22	15 ▲			
Slovenia	4	4	3		4	27	25	21 ▲		22 ▲
Italy	3	3	3	4		24	17 ▲	19 ▲	21	
Armenia	3		2			18		21 ▼		
Ψ Macedonia, Rep. of	3		1 ▲	2		12		9	13	
Georgia	3	1 ▲				13	7 ▲			
Ψ Iran, Islamic Rep. of	2	1 ▲	0 ▲	1 ▲	0 ▲	8	5 ▲	3 ▲	6	4 ▲
Malaysia	2	2	6 ▼	10 ▼		12	18 ▼	30 ▼	36 ▼	
Thailand	2	3		3 ▼		8	12 ▼		17 ▼	
Ψ Bahrain	1	0 ▲	0 ▲			8	3 ▲	2 ▲		
Sweden	1	2 ▼	3 ▼		12 ▼	16	20 ▼	24 ▼		46 ▼
Ψ Palestinian Nat'l Auth.	1	0 ▲	0 ▲			7	3 ▲	4 ▲		
Lebanon	1	1	0 ▲			9	10	4 ▲		
Norway	1	0	0		4 ▼	12	11	10		26 ▼
Chile	1		0	1		5		3 ▲	4	
Ψ Jordan	0	1 ▼	1	3 ▼		6	11 ▼	8	12 ▼	
Ψ Oman	0	0 ▲				4	2 ▲			
Tunisia	0	0 ▲	0 ▲	0		5	3 ▲	1 ▲	5	
Finland (7)	0			5 ▼		14			33 ▼	
Ψ Syrian Arab Republic	0	0				3	3			
Ψ Indonesia	0	0				2	4 ▼			
Benchmarking Participants										
Massachusetts, US	19	16		8 ▲		57	52		33 ▲	
North Carolina, US	14			6 ▲		44			27 ▲	
Minnesota, US	13	8			7	49	41			36 ▲
Connecticut, US	10			9		37			33	
Indiana, US	7		5	7		35		27	32	
Quebec, Canada	6	8	8	18 ▼	14 ▼	40	37	45	60 ▼	54 ▼
Dubai, UAE	5	3				23	17 ▲			
Ontario, Canada	4	6	6	6	3	31	33	34	32	26 ▲
Alberta, Canada	3			7 ▼	6 ▼	24			40 ▼	39 ▼

▲ 2011 percent significantly higher

▼ 2011 percent significantly lower

Ψ Reservations about reliability of average achievement because the percentage of students with achievement too low for estimation does not exceed 25% but exceeds 15%. Such annotations in exhibits with trend data began in 2011, so data from assessments prior to 2011 are not annotated for reservations.

An empty cell indicates a country did not participate in that year's assessment.

Trend Notes: Trend results for Finland are based on 7th grade data from 1999 and 2011, and so Finland's 2011 results differ from Exhibit 2.19.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 2.20: Trends in Percentages of Students Reaching the International Benchmarks of Mathematics Achievement (Continued)

TIMSS 2011 Mathematics 8th Grade

Country	Intermediate International Benchmark (475)					Low International Benchmark (400)				
	Percent of Students					Percent of Students				
	2011	2007	2003	1999	1995	2011	2007	2003	1999	1995
Chinese Taipei	88	86	85 ▲	85 ▲		96	95	96	95 ▲	
Singapore	92	88 ▲	93	94	98 ▼	99	97 ▲	99	99	100 ▼
Korea, Rep. of	93	90 ▲	90 ▲	91	89 ▲	99	98 ▲	98 ▲	99	97 ▲
Hong Kong SAR	89	85	93	92	88	97	94	98	98	96
Japan	87	87	88	90 ▼	91 ▼	97	97	98 ▼	98 ▼	98 ▼
Russian Federation	78	68 ▲	66 ▲	73	73	95	91 ▲	92 ▲	93	93
Australia	63	61	65		68	89	89	90		90
England	65	69	61	60	61	88	90	90	88	87
Hungary	65	69	75 ▼	75 ▼	74 ▼	88	91 ▼	95 ▼	93 ▼	94 ▼
United States	68	67	64	62 ▲	61 ▲	92	92	90	87 ▲	86 ▲
Romania	44	46	52 ▼	51 ▼	52 ▼	71	73	79 ▼	79 ▼	79 ▼
Lithuania	64	65	63	53 ▲	50 ▲	90	90	90	85 ▲	81 ▲
New Zealand	57		59	57	64 ▼	84		88	84	89 ▼
Ukraine	53	46 ▲				81	76 ▲			
Slovenia	67	65	60 ▲		60 ▲	93	92	90		90 ▲
Italy	64	54 ▲	56 ▲	53 ▲		90	85 ▲	86 ▲	82 ▲	
Armenia	49		54 ▼			76		82 ▼		
Ψ Macedonia, Rep. of	35		34	40		61		66 ▼	70 ▼	
Georgia	36	26 ▲				62	56 ▲			
Ψ Iran, Islamic Rep. of	26	20 ▲	20 ▲	26	24	55	51	55	61 ▼	59
Malaysia	36	50 ▼	66 ▼	70 ▼		65	82 ▼	93 ▼	93 ▼	
Thailand	28	34 ▼		45 ▼		62	66		79 ▼	
Ψ Bahrain	26	19 ▲	17 ▲			53	49 ▲	51 ▲		
Sweden	57	60 ▼	64 ▼		81 ▼	89	90	91 ▼		96 ▼
Ψ Palestinian Nat'l Auth.	25	15 ▲	19 ▲			52	39 ▲	46 ▲		
Lebanon	38	36	27 ▲			73	74	68 ▲		
Norway	51	48	44 ▲		64 ▼	87	85	81 ▲		90 ▼
Chile	23		15 ▲	16 ▲		57		41 ▲	46 ▲	
Ψ Jordan	26	35 ▼	30	33 ▼		55	61 ▼	60 ▼	61 ▼	
Ψ Oman	16	14				39	41			
Tunisia	25	21 ▲	15 ▲	34 ▼		61	61	55 ▲	78 ▼	
Finland (7)	57			77 ▼		90			96 ▼	
Ψ Syrian Arab Republic	17	17				43	47			
Ψ Indonesia	15	19 ▼				43	48			
Benchmarking Participants										
Massachusetts, US	88	82 ▲		69 ▲		98	95 ▲		92 ▲	
North Carolina, US	78			59 ▲		95			87 ▲	
Minnesota, US	83	81			73 ▲	97	97			94 ▲
Connecticut, US	69			68		91			90	
Indiana, US	74		68	71		95		94	93	
Quebec, Canada	82	78	88 ▼	93 ▼	90 ▼	98	97	99 ▼	99 ▼	99 ▼
Dubai, UAE	53	47 ▲				79	74 ▲			
Ontario, Canada	71	74	75 ▼	72	65 ▲	94	95	97 ▼	96 ▼	91 ▲
Alberta, Canada	69			81 ▼	79 ▼	95			97	97

▲ Percent significantly higher than 2011

▼ Percent significantly lower than 2011

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Eighth Grade TIMSS 2011 Low International Benchmark

Exhibit 2.21 presents the description of student achievement at the Low International Benchmark. Students have an elementary understanding of whole numbers and decimals and can do basic computations. They can match tables to bar graphs and pictographs and read a simple line graph.

Exhibit 2.22 presents Example Item 1, which involved adding a two-place and three-place decimal. This item, exemplifying performance at the low level, was answered correctly by 72 percent of the eighth grade students, internationally, on average. More than 80 percent of the students answered correctly in many countries.

Example Item 2, shown in Exhibit 2.23, illustrates another type of item students at the low level could answer correctly. One of the algebra topics in the TIMSS 2011 Mathematics Framework at the eighth grade is algebraic expressions, and this item asks students to evaluate a simple algebraic expression. Similar to the results for Example Item 1, internationally, on average, 71 percent of the eighth grade students answered correctly. Also, more than 80 percent of the students answered this substitution item correctly in almost one-third of the countries.

Exhibit 2.21: Description of the TIMSS 2011 Low International Benchmark (400) of Mathematics Achievement

Low International Benchmark

400

Summary

Students have some knowledge of whole numbers and decimals, operations, and basic graphs.

The few items at this level provide some evidence that students have an elementary understanding of whole numbers and decimals and can do basic computations. They can match tables to bar graphs and pictographs and read a simple line graph.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 2.22: Low International Benchmark – Example Item 1

Country	Percent Full Credit
[2] Singapore	94 (0.8) ▲
Malaysia	91 (1.2) ▲
Hong Kong SAR	91 (1.5) ▲
Kazakhstan	90 (1.8) ▲
[1] Lithuania	90 (1.5) ▲
[2] Russian Federation	90 (1.2) ▲
Chinese Taipei	89 (1.1) ▲
[2] United States	89 (1.0) ▲
Hungary	88 (1.3) ▲
Italy	88 (1.6) ▲
Korea, Rep. of	87 (1.5) ▲
Slovenia	85 (1.7) ▲
Armenia	84 (1.9) ▲
Tunisia	82 (1.8) ▲
[3] Israel	82 (1.4) ▲
Australia	82 (2.0) ▲
Norway	81 (1.9) ▲
Lebanon	81 (1.7) ▲
Japan	81 (1.6) ▲
Ukraine	80 (2.4) ▲
United Arab Emirates	79 (1.2) ▲
Sweden	79 (1.7) ▲
‡ England	79 (2.4) ▲
Finland	79 (1.8) ▲
International Avg.	72 (0.3)
Morocco	72 (1.7)
Qatar	72 (1.5)
New Zealand	70 (2.9)
Romania	69 (2.5)
Saudi Arabia	65 (2.5) ▼
Macedonia, Rep. of	65 (2.6) ▼
[1] Georgia	64 (2.9) ▼
Thailand	64 (2.4) ▼
Chile	58 (2.2) ▼
Indonesia	57 (2.2) ▼
Palestinian Nat'l Auth.	56 (1.9) ▼
Oman	49 (1.6) ▼
Turkey	48 (1.8) ▼
Bahrain	43 (2.3) ▼
Iran, Islamic Rep. of	42 (2.2) ▼
Jordan	36 (1.7) ▼
Ghana	36 (2.1) ▼
Syrian Arab Republic	31 (2.4) ▼

Content Domain: Number

Cognitive Domain: Knowing

Description: Adds a two-place and a three-place decimal

42.65 + 5.748 =

Answer: 48.398

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The answer shown illustrates the type of student response that was given 1 of 1 points.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Country	Percent Full Credit
Ninth Grade Participants	
Botswana	74 (1.4)
[2] Honduras	66 (2.3) ▼
South Africa	63 (2.0) ▼

Country	Percent Full Credit
Benchmarking Participants	
[1] [2] Massachusetts, US	95 (1.3) ▲
[1] Minnesota, US	93 (1.6) ▲
[1] [2] Florida, US	93 (1.8) ▲
[1] Alabama, US	92 (2.5) ▲
[1] [2] Connecticut, US	91 (1.7) ▲
[1] [2] Indiana, US	90 (1.8) ▲
[1] [3] North Carolina, US	90 (2.5) ▲
Quebec, Canada	90 (1.4) ▲
[1] [2] California, US	89 (1.4) ▲
[2] Alberta, Canada	86 (1.3) ▲
[2] Ontario, Canada	85 (1.7) ▲
[1] Colorado, US	82 (2.2) ▲
Abu Dhabi, UAE	81 (2.1) ▲
Dubai, UAE	80 (2.1) ▲

▲ Percent significantly higher than international average

▼ Percent significantly lower than international average

See Appendix C.3 for target population coverage notes 1, 2, and 3. See Appendix C.9 for sampling guidelines and sampling participation notes †, ‡, and ‡.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Exhibit 2.23: Low International Benchmark – Example Item 2

Country	Percent Correct	
Korea, Rep. of	92 (1.0)	▲
Chinese Taipei	91 (1.0)	▲
2 Singapore	91 (1.1)	▲
2 Russian Federation	91 (1.6)	▲
2 United States	89 (1.0)	▲
Japan	86 (1.5)	▲
Kazakhstan	86 (1.9)	▲
Hong Kong SAR	83 (1.8)	▲
1 Lithuania	83 (1.8)	▲
Ukraine	81 (2.5)	▲
Hungary	81 (1.7)	▲
Armenia	81 (1.8)	▲
Italy	80 (2.1)	▲
Slovenia	78 (2.1)	▲
Finland	78 (1.8)	▲
Romania	75 (1.9)	▲
Sweden	75 (1.7)	▲
‡ England	73 (2.9)	
3 Israel	72 (2.2)	
Macedonia, Rep. of	71 (2.3)	
Australia	71 (2.6)	
International Avg.	71 (0.3)	
Norway	70 (2.5)	
1 Georgia	68 (2.2)	
Qatar	66 (1.6)	▼
Turkey	66 (1.8)	▼
Jordan	65 (2.2)	▼
Indonesia	65 (2.4)	▼
Chile	65 (2.1)	▼
Syrian Arab Republic	65 (2.3)	▼
United Arab Emirates	64 (1.4)	▼
Bahrain	64 (2.1)	▼
Tunisia	62 (2.0)	▼
New Zealand	61 (2.6)	▼
Lebanon	60 (2.6)	▼
Palestinian Nat'l Auth.	59 (1.8)	▼
Saudi Arabia	57 (2.4)	▼
Thailand	56 (2.2)	▼
Iran, Islamic Rep. of	51 (2.5)	▼
Ghana	49 (2.1)	▼
Oman	48 (1.5)	▼
Malaysia	47 (2.1)	▼
Morocco	45 (1.8)	▼

Content Domain: Algebra

Cognitive Domain: Knowing

Description: Evaluates a simple algebraic expression

$$y = \frac{a+b}{c}$$

$a = 8$, $b = 6$, and $c = 2$

What is the value of y?

● 7

Ⓑ 10

Ⓒ 11

Ⓓ 14

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SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Country	Percent Correct	
Ninth Grade Participants		
Botswana	62 (2.0)	▼
2 Honduras	50 (2.1)	▼
South Africa	43 (1.4)	▼

Country	Percent Correct	
Benchmarking Participants		
1 2 Massachusetts, US	94 (1.3)	▲
1 2 Indiana, US	93 (1.3)	▲
1 Minnesota, US	92 (1.5)	▲
1 2 Florida, US	90 (2.2)	▲
1 2 California, US	89 (2.1)	▲
1 3 North Carolina, US	89 (2.5)	▲
1 2 Connecticut, US	88 (2.0)	▲
1 Alabama, US	84 (3.1)	▲
1 Colorado, US	84 (2.2)	▲
2 Ontario, Canada	78 (2.0)	▲
Quebec, Canada	75 (1.8)	▲
Dubai, UAE	73 (1.9)	
2 Alberta, Canada	71 (2.2)	
Abu Dhabi, UAE	64 (2.3)	▼

▲ Percent significantly higher than international average

▼ Percent significantly lower than international average

See Appendix C.3 for target population coverage notes 1, 2, and 3. See Appendix C.9 for sampling guidelines and sampling participation notes †, ‡, and ‡.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Eighth Grade TIMSS 2011 Intermediate International Benchmark

Exhibit 2.24 provides the description of student achievement at the Intermediate International Benchmark. Students at this level can solve problems involving decimals, fractions, proportions, and percentages. They know the meaning of simple algebraic expressions and can relate a two-dimensional drawing to a three-dimensional object. They can locate and interpret data presented in various tabular and graphic formats, and have some understanding of the likelihood of an event.

As mentioned in discussing performance at the low level (Example Item 2), algebraic expressions was a topic in the TIMSS Framework. Example Item 3 shown in Exhibit 2.25 is a slightly more difficult item assessing this topic. This item asks students to identify the meaning of a simple algebraic expression, therefore they need to understand the symbolic representation.

Exhibit 2.26 presents Example Item 4 from the domain of geometric figures. One geometry topic is recognizing relationships between three-dimensional and two-dimensional shapes, and this item asked students to recognize a pyramid from its net and then draw it directly from above. On average, internationally, 58 percent of the eighth grade students answered correctly. Clearly, such visualization tasks are more widely taught in some countries than others.

Exhibit 2.24: Description of the TIMSS 2011 Intermediate International Benchmark (475) of Mathematics Achievement

Intermediate International Benchmark

475

Summary

Students can apply basic mathematical knowledge in a variety of situations. Students can solve problems involving decimals, fractions, proportions, and percentages. They understand simple algebraic relationships. Students can relate a two-dimensional drawing to a three-dimensional object. They can read, interpret, and construct graphs and tables. They recognize basic notions of likelihood.

Students can solve problems involving decimals, fractions, proportions, and percentages in a variety of settings. For example, they can determine proportions of a whole in order to construct pie charts and calculate unit prices to solve a problem.

Students at this level know the meaning of simple algebraic expressions. For example, they can identify an algebraic expression that represents a situation. They can extend number patterns to the next few terms.

Students can relate a two-dimensional drawing to a three-dimensional object and solve a simple problem involving angles.

Students can locate and interpret data presented in tables, bar graphs, pie charts, and line graphs. For example, they can use information in a table to complete a bar graph. They can compare data from two line graphs to solve a problem. They have some understanding of the likelihood of an event and can determine the chances of outcomes of simple events.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 2.25: Intermediate International Benchmark – Example Item 3

Country	Percent Correct	
Hong Kong SAR	94 (1.3)	▲
Korea, Rep. of	91 (1.3)	▲
[2] Singapore	91 (1.1)	▲
Chinese Taipei	90 (1.3)	▲
[2] Russian Federation	89 (1.2)	▲
Japan	87 (1.5)	▲
Ukraine	81 (2.1)	▲
[2] United States	80 (1.2)	▲
Armenia	79 (1.9)	▲
Slovenia	76 (2.0)	▲
[1] Lithuania	75 (2.3)	▲
[3] Israel	74 (2.0)	▲
Kazakhstan	73 (1.9)	▲
Hungary	73 (1.9)	▲
Finland	72 (2.2)	▲
‡ England	72 (2.8)	▲
[1] Georgia	71 (1.8)	▲
Australia	71 (2.3)	▲
Jordan	69 (2.0)	
United Arab Emirates	66 (1.4)	
International Avg.	65 (0.3)	
Italy	65 (2.0)	
Romania	65 (2.3)	
Macedonia, Rep. of	63 (2.5)	
Bahrain	62 (1.7)	
New Zealand	60 (2.3)	▼
Thailand	60 (2.5)	▼
Lebanon	59 (2.6)	▼
Turkey	58 (1.9)	▼
Chile	58 (2.4)	▼
Saudi Arabia	57 (2.2)	▼
Palestinian Nat'l Auth.	56 (2.0)	▼
Qatar	55 (2.3)	▼
Iran, Islamic Rep. of	55 (2.0)	▼
Sweden	53 (2.0)	▼
Tunisia	49 (1.8)	▼
Indonesia	48 (2.3)	▼
Syrian Arab Republic	48 (2.2)	▼
Oman	47 (1.7)	▼
Malaysia	43 (2.0)	▼
Morocco	41 (1.6)	▼
Ghana	36 (1.8)	▼
Norway	36 (2.6)	▼

Content Domain: Algebra

Cognitive Domain: Knowing

Description: Knows the meaning of a simple algebraic expression involving multiplication and addition

What does $xy + 1$ mean?

Ⓐ Add 1 to y, then multiply by x.

Ⓑ Multiply x and y by 1.

Ⓒ Add x to y, then add 1.

● Multiply x by y, then add 1.

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SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Country	Percent Correct	
Ninth Grade Participants		
Botswana	52 (1.7)	▼
South Africa	30 (1.5)	▼
[2] Honduras	26 (2.0)	▼

Country	Percent Correct	
Benchmarking Participants		
[1 2] Massachusetts, US	91 (1.9)	▲
[1] Minnesota, US	88 (2.1)	▲
[1 2] Florida, US	88 (2.6)	▲
[1 2] Indiana, US	86 (1.6)	▲
[1 3] North Carolina, US	84 (2.1)	▲
[1 2] Connecticut, US	83 (2.3)	▲
[2] Ontario, Canada	81 (2.0)	▲
[1 2] California, US	79 (2.8)	▲
[2] Alberta, Canada	78 (2.1)	▲
[1] Alabama, US	77 (2.9)	▲
[1] Colorado, US	76 (3.3)	▲
Dubai, UAE	72 (1.6)	▲
Quebec, Canada	68 (2.0)	
Abu Dhabi, UAE	63 (2.5)	

▲ Percent significantly higher than international average

▼ Percent significantly lower than international average

See Appendix C.3 for target population coverage notes 1, 2, and 3. See Appendix C.9 for sampling guidelines and sampling participation notes †, ‡, and ‡.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

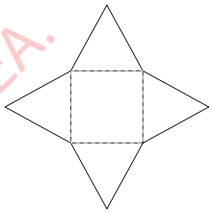
Exhibit 2.26: Intermediate International Benchmark – Example Item 4

Country	Percent Full Credit	
Japan	89 (1.2)	▲
Finland	89 (1.1)	▲
Australia	87 (1.2)	▲
Korea, Rep. of	85 (1.3)	▲
New Zealand	84 (1.7)	▲
2 Singapore	83 (1.4)	▲
‡ England	82 (2.1)	▲
2 United States	81 (1.0)	▲
Slovenia	81 (1.7)	▲
1 Lithuania	78 (1.7)	▲
Hungary	77 (1.9)	▲
Hong Kong SAR	77 (2.0)	▲
2 Russian Federation	75 (1.7)	▲
Norway	74 (2.4)	▲
Chinese Taipei	74 (1.7)	▲
Chile	70 (1.8)	▲
Italy	70 (2.3)	▲
3 Israel	66 (1.9)	▲
Sweden	65 (1.9)	▲
Kazakhstan	60 (2.4)	
Ukraine	59 (3.1)	
International Avg.	58 (0.3)	
Turkey	57 (1.8)	
Malaysia	53 (1.8)	▼
Thailand	51 (2.4)	▼
United Arab Emirates	50 (1.4)	▼
Bahrain	49 (2.5)	▼
Romania	47 (2.2)	▼
Macedonia, Rep. of	47 (2.5)	▼
Iran, Islamic Rep. of	45 (2.2)	▼
Tunisia	44 (1.9)	▼
Jordan	42 (1.8)	▼
Armenia	41 (1.9)	▼
Qatar	40 (2.7)	▼
Palestinian Nat'l Auth.	37 (2.1)	▼
Saudi Arabia	37 (2.2)	▼
1 Georgia	37 (2.5)	▼
Oman	36 (1.5)	▼
Morocco	35 (1.4)	▼
Indonesia	27 (2.2)	▼
Syrian Arab Republic	26 (2.4)	▼
Lebanon	22 (2.2)	▼
Ghana	10 (1.3)	▼

Content Domain: Geometry

Cognitive Domain: Knowing

Description: Given a net of a three-dimensional object, completes a two-dimensional drawing of it from a specific viewpoint



The shape shown above is cut out of cardboard. The triangle flaps are then folded up along the dotted lines until they touch the edges of the flaps next to them.

Complete the diagram below to show what the shape would look like when viewed from directly above.



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The answer shown illustrates the type of student response that was given 1 of 1 points.

Country	Percent Full Credit	
Ninth Grade Participants		
2 Honduras	33 (2.5)	▼
Botswana	32 (1.8)	▼
South Africa	26 (1.3)	▼

Country	Percent Full Credit	
Benchmarking Participants		
1 2 Massachusetts, US	90 (1.7)	▲
1 Minnesota, US	89 (1.7)	▲
2 Alberta, Canada	86 (1.6)	▲
2 Ontario, Canada	86 (1.4)	▲
1 Colorado, US	85 (2.1)	▲
1 3 North Carolina, US	82 (2.6)	▲
Quebec, Canada	80 (1.9)	▲
1 2 Indiana, US	79 (2.8)	▲
1 2 Florida, US	79 (2.6)	▲
1 2 Connecticut, US	79 (2.8)	▲
1 2 California, US	76 (2.8)	▲
1 Alabama, US	69 (2.6)	▲
Dubai, UAE	57 (1.9)	
Abu Dhabi, UAE	50 (2.5)	▼

▲ Percent significantly higher than international average

▼ Percent significantly lower than international average

See Appendix C.3 for target population coverage notes 1, 2, and 3. See Appendix C.9 for sampling guidelines and sampling participation notes †, ‡, and ‡.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Eighth Grade TIMSS 2011 High International Benchmark

Exhibit 2.27 presents the description of achievement at the High International Benchmark. Eighth grade students at this level could apply their mathematical knowledge and understanding in a variety of relatively complex situations. For example, they could relate fractions, decimals, and percents to each other. They showed procedural knowledge related to algebraic expressions and could identify the quantity that satisfies two inequalities. They could use properties of lines, angles, and triangles to solve problems. Students also could analyze data from pie charts, line graphs, and bar graphs to solve problems and provide explanations, as well as solve simple problems involving outcomes and probabilities.

Example Item 5, shown in Exhibit 2.28, illustrates the growing facility demonstrated by students at the High Benchmark in converting between percents and fractions. This constructed response item was successfully completed by 37 percent of students, internationally, on average. Singapore was by far the top-performer, with 89 percent correct.

Exhibit 2.29 presents Example Item 6, showing a problem situation involving inequalities represented by balances that can readily be solved using algebra. Nearly four-fifths of the Korean students answered this item correctly. The country-by-country results indicate that students in the East Asian countries are familiar with algebra by the eighth grade, as are students in Finland and the Russian Federation. However, in about a dozen countries, only about one-third or fewer of the students answered this problem correctly. Internationally, on average, 47 percent of the eighth grade students answered correctly.

Example Item 7, shown in Exhibit 2.30, is an example of a data display problem likely to be answered correctly by students reaching the High Benchmark. Students needed to compute the correct proportions from the data in the table, and then construct and label their own pie chart. Internationally, on average, 47 percent of the students answered correctly.

Exhibit 2.27: Description of the TIMSS 2011 High International Benchmark (550) of Mathematics Achievement

High International Benchmark

550

Summary

Students can apply their understanding and knowledge in a variety of relatively complex situations. Students can use information from several sources to solve problems involving different types of numbers and operations. Students can relate fractions, decimals, and percents to each other. Students at this level show basic procedural knowledge related to algebraic expressions. They can use properties of lines, angles, triangles, rectangles, and rectangular prisms to solve problems. They can analyze data in a variety of graphs.

Students can use information from several sources to solve problems involving different types of numbers and operations. Students can relate fractions, decimals, and percents to each other. They can solve problems with fractions, proportions, and percentages. Students show understanding of whole number exponents. They can identify the prime factorization of a given number.

Students at this level show basic procedural knowledge related to algebraic expressions. They can evaluate a variety of expressions and formulas. They can simplify an algebraic expression by combining like terms and identify equivalent expressions. They can identify algebraic expressions that correspond to simple situations and add algebraic expressions. Students can identify the solutions of linear equations and a pair of simultaneous linear equations, and identify the quantity that satisfies two inequalities.

Students can use properties of lines, angles, and triangles to solve problems. They can find the perimeter of a square given its area or vice-versa. They can solve problems involving rectangular prisms. Students can produce a drawing that meets given angle specifications. They can recognize rotations and reflections, visualize a figure cut from a folded piece of paper, and draw the missing half of a symmetrical figure.

Students can solve simple problems involving outcomes and probabilities. They can calculate means and determine medians. They can analyze data from pie charts, line graphs, and bar graphs to solve problems and provide explanations.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 2.28: High International Benchmark – Example Item 5

Country	Percent Full Credit	
[2] Singapore	89 (1.2)	▲
Korea, Rep. of	76 (1.9)	▲
Hong Kong SAR	76 (2.4)	▲
Chinese Taipei	69 (1.7)	▲
Japan	57 (2.2)	▲
[3] Israel	57 (2.1)	▲
[2] Russian Federation	55 (2.1)	▲
[2] United States	54 (1.5)	▲
Australia	53 (2.6)	▲
[1] Lithuania	53 (1.9)	▲
Sweden	51 (1.8)	▲
Finland	50 (2.4)	▲
Slovenia	49 (2.2)	▲
‡ England	48 (3.0)	▲
New Zealand	46 (2.8)	▲
Hungary	46 (2.5)	▲
Italy	46 (2.3)	▲
Norway	42 (2.4)	
Malaysia	42 (2.3)	
International Avg.	37 (0.3)	
United Arab Emirates	37 (1.4)	
Kazakhstan	36 (2.5)	
Lebanon	35 (2.5)	
Armenia	34 (2.2)	
Turkey	33 (1.6)	▼
Ukraine	33 (2.7)	
Romania	26 (1.8)	▼
Chile	26 (1.5)	▼
Qatar	24 (1.4)	▼
Macedonia, Rep. of	22 (2.0)	▼
Bahrain	22 (1.7)	▼
Iran, Islamic Rep. of	22 (2.0)	▼
Indonesia	20 (1.9)	▼
[1] Georgia	20 (2.0)	▼
Tunisia	19 (1.7)	▼
Thailand	18 (2.1)	▼
Palestinian Nat'l Auth.	18 (1.8)	▼
Syrian Arab Republic	17 (1.9)	▼
Saudi Arabia	12 (1.6)	▼
Morocco	11 (0.8)	▼
Jordan	11 (1.2)	▼
Oman	10 (1.0)	▼
Ghana	8 (1.2)	▼

Content Domain: Number

Cognitive Domain: Knowing

Description: Given the part and the whole, can express the part as a percentage, and given the whole and the percentage, can find the part

Peter, James, and Andrew each had 20 tries at throwing balls into a basket.

Complete the missing boxes below.

Name	Number of Successful Shots	Percentage of Successful Shots
Peter	10 out of 20	50 %
James	15 out of 20	75 %
Andrew	16 out of 20	80%

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The answer shown illustrates the type of student response that was given 2 of 2 points.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Country	Percent Full Credit	
Ninth Grade Participants		
Botswana	47 (2.0)	▲
South Africa	18 (1.0)	▼
[2] Honduras	11 (1.3)	▼

Country	Percent Full Credit	
Benchmarking Participants		
Quebec, Canada	81 (1.8)	▲
[1 2] Massachusetts, US	79 (2.5)	▲
[1] Minnesota, US	77 (2.7)	▲
[2] Alberta, Canada	75 (2.3)	▲
[2] Ontario, Canada	68 (2.1)	▲
[1 3] North Carolina, US	62 (3.2)	▲
[1 2] Connecticut, US	59 (2.8)	▲
[1 2] Indiana, US	59 (3.6)	▲
[1 2] Florida, US	58 (4.0)	▲
[1] Colorado, US	51 (3.5)	▲
Dubai, UAE	46 (1.8)	▲
[1 2] California, US	41 (3.1)	
Abu Dhabi, UAE	34 (2.6)	
[1] Alabama, US	31 (4.4)	

▲ Percent significantly higher than international average

▼ Percent significantly lower than international average

See Appendix C.3 for target population coverage notes 1, 2, and 3. See Appendix C.9 for sampling guidelines and sampling participation notes †, ‡, and ‡.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Exhibit 2.29: High International Benchmark – Example Item 6

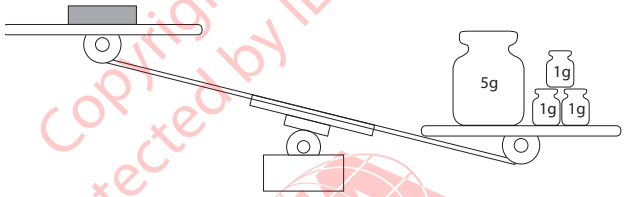
Country	Percent Correct	
Korea, Rep. of	79 (1.6)	▲
Japan	76 (2.0)	▲
2 Singapore	75 (1.7)	▲
Finland	74 (1.9)	▲
Chinese Taipei	74 (1.6)	▲
Hong Kong SAR	68 (2.1)	▲
2 Russian Federation	67 (2.2)	▲
‡ England	62 (2.8)	▲
Australia	62 (2.4)	▲
Sweden	62 (2.1)	▲
1 Lithuania	61 (2.4)	▲
Hungary	58 (2.3)	▲
Slovenia	58 (2.3)	▲
3 Israel	58 (2.4)	▲
2 United States	57 (1.5)	▲
New Zealand	57 (2.4)	▲
Norway	55 (2.5)	▲
Ukraine	54 (2.7)	▲
Italy	51 (2.2)	▲
1 Georgia	50 (2.6)	
Turkey	47 (1.7)	
International Avg.	47 (0.3)	
Thailand	46 (2.0)	
Chile	45 (1.7)	
Kazakhstan	43 (2.7)	
Romania	40 (2.3)	▼
Armenia	38 (2.4)	▼
United Arab Emirates	37 (1.4)	▼
Iran, Islamic Rep. of	37 (2.1)	▼
Malaysia	36 (2.4)	▼
Macedonia, Rep. of	35 (2.4)	▼
Lebanon	34 (2.4)	▼
Jordan	33 (1.9)	▼
Tunisia	32 (1.8)	▼
Qatar	32 (2.0)	▼
Bahrain	30 (2.1)	▼
Palestinian Nat'l Auth.	26 (2.0)	▼
Saudi Arabia	24 (2.1)	▼
Syrian Arab Republic	22 (2.1)	▼
Oman	22 (1.3)	▼
Morocco	18 (1.2)	▼
Indonesia	18 (1.6)	▼
Ghana	9 (0.9)	▼

Content Domain: Algebra

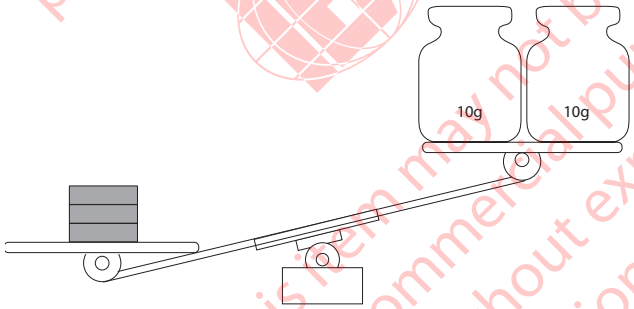
Cognitive Domain: Reasoning

Description: Identifies the quantity that satisfies two inequalities represented by balances in a problem situation

Jo has three metal blocks. The weight of each block is the same.
When she weighed one block against 8 grams, this is what happened.



When she weighed all three blocks against 20 grams, this is what happened.



Which of the following could be the weight of one metal block?

Ⓐ 5 g
Ⓑ 6 g
● 7 g
Ⓓ 8 g

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Country	Percent Correct	
Ninth Grade Participants		
Botswana	19 (1.6)	▼
South Africa	16 (1.1)	▼
2 Honduras	16 (1.7)	▼

Country	Percent Correct	
Benchmarking Participants		
1 2 Massachusetts, US	69 (2.6)	▲
Quebec, Canada	67 (2.1)	▲
1 Minnesota, US	66 (3.2)	▲
1 2 Connecticut, US	61 (2.7)	▲
1 2 Indiana, US	61 (3.7)	▲
1 3 North Carolina, US	60 (3.8)	▲
1 2 Florida, US	60 (3.9)	▲
2 Alberta, Canada	59 (2.4)	▲
1 Colorado, US	59 (2.9)	▲
2 Ontario, Canada	59 (2.2)	▲
1 2 California, US	49 (3.2)	
Dubai, UAE	48 (2.7)	
1 Alabama, US	42 (2.9)	
Abu Dhabi, UAE	35 (2.3)	▼

▲ Percent significantly higher than international average
▼ Percent significantly lower than international average

See Appendix C.3 for target population coverage notes 1, 2, and 3. See Appendix C.9 for sampling guidelines and sampling participation notes †, ‡, and ‡.
() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 2.30: High International Benchmark – Example Item 7

Country	Percent Full Credit
[2] Singapore	85 (1.5) ▲
Korea, Rep. of	85 (1.4) ▲
Chinese Taipei	80 (1.7) ▲
Hong Kong SAR	76 (1.8) ▲
Japan	75 (1.7) ▲
Finland	70 (2.3) ▲
Slovenia	67 (2.5) ▲
Australia	67 (2.3) ▲
‡ England	65 (3.0) ▲
[3] Israel	63 (1.9) ▲
[2] Russian Federation	63 (2.6) ▲
[2] United States	62 (1.7) ▲
[1] Lithuania	62 (2.5) ▲
Hungary	62 (2.1) ▲
Norway	61 (2.7) ▲
New Zealand	59 (2.5) ▲
Sweden	58 (1.9) ▲
Italy	54 (2.5) ▲
Malaysia	50 (2.2)
Ukraine	48 (3.0)
Turkey	48 (2.0)
International Avg.	47 (0.3)
Thailand	45 (2.3)
Chile	44 (1.7)
United Arab Emirates	41 (1.4) ▼
Kazakhstan	40 (2.8) ▼
Jordan	34 (2.1) ▼
Qatar	33 (2.2) ▼
Bahrain	33 (1.8) ▼
Oman	30 (1.5) ▼
Palestinian Nat'l Auth.	30 (1.8) ▼
[1] Georgia	30 (2.1) ▼
Romania	29 (2.2) ▼
Indonesia	28 (2.2) ▼
Tunisia	27 (1.9) ▼
Armenia	25 (2.2) ▼
Macedonia, Rep. of	24 (2.1) ▼
Iran, Islamic Rep. of	23 (1.8) ▼
Syrian Arab Republic	23 (2.4) ▼
Saudi Arabia	19 (1.9) ▼
Morocco	18 (1.1) ▼
Lebanon	17 (1.7) ▼
Ghana	11 (1.3) ▼

Content Domain: Data and Chance

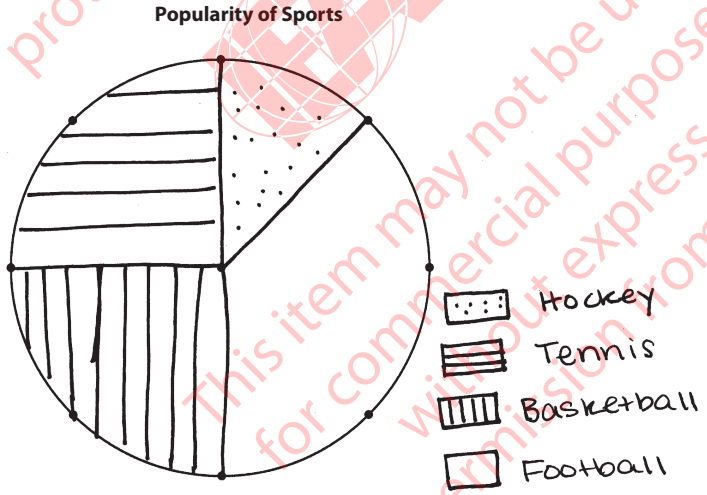
Cognitive Domain: Applying

Description: Constructs and labels a pie chart representing a given situation

480 students were asked to name their favorite sport. The results are shown in this table.

Sport	Number of Students
Hockey	60
Football	180
Tennis	120
Basketball	120

Use the information in the table to complete and label this pie chart.



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The answer shown illustrates the type of student response that was given 2 of 2 points.

Country	Percent Full Credit
Ninth Grade Participants	
Botswana	40 (1.8) ▼
South Africa	28 (1.5) ▼
[2] Honduras	23 (2.1) ▼

Country	Percent Full Credit
Benchmarking Participants	
[1 2] Massachusetts, US	74 (2.7) ▲
Quebec, Canada	72 (1.8) ▲
[1] Minnesota, US	71 (2.6) ▲
[1 2] Connecticut, US	70 (3.6) ▲
[1 2] Indiana, US	69 (2.7) ▲
[1] Colorado, US	69 (3.6) ▲
[1 3] North Carolina, US	67 (2.9) ▲
[2] Ontario, Canada	67 (2.0) ▲
[2] Alberta, Canada	66 (2.2) ▲
[1 2] Florida, US	65 (3.8) ▲
[1 2] California, US	58 (2.8) ▲
[1] Alabama, US	55 (3.8) ▲
Dubai, UAE	48 (1.7)
Abu Dhabi, UAE	40 (2.5) ▼

▲ Percent significantly higher than international average

▼ Percent significantly lower than international average

See Appendix C.3 for target population coverage notes 1, 2, and 3. See Appendix C.9 for sampling guidelines and sampling participation notes †, ‡, and ‡.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

TIMSS & PIRLS International Study Center Lynch School of Education, Boston College

Eighth Grade TIMSS 2011 Advanced International Benchmark

Exhibit 2.31 describes eighth grade performance at the Advanced International Benchmark. Students reaching this level were adept at many of the topics in the TIMSS 2011 Mathematics Framework. They could reason with a variety of different types of numbers (whole numbers, negative numbers, fractions, and percentages) in routine and non-routine situations and justify their conclusions. They could express generalization algebraically and solve a variety of problems involving equations, formulas, and functions. They could reason with geometric figures to solve problems and reason with data from several sources to solve multi-step problems.

Example Item 8 in Exhibit 2.32 shows an example of the types of items students at the Advanced International Benchmark could answer correctly. It illustrates how students could reason with fractions in an abstract, non-routine situation. They were given two points on a number line representing unspecified fractions, and asked to identify the point that represented their product. Even in the multiple-choice format, only 23 percent of the eighth grade students internationally answered correctly, on average.

Exhibit 2.33 contains Example Item 9, which involves geometric measurement. Specifically, this is a constructed-response item asking students how many books of a given size will fit in a box of a given size. Once again, approximately 60 percent of students or more in the five top-performing East Asian countries could solve this problem. The next highest achievement, however, was 36 percent in the Russian Federation; and in many countries, very few students could solve this problem.

Example Item 10 in Exhibit 2.34 asks students to solve a linear inequality. This was beyond many students in most countries, except in Korea and Chinese Taipei, where 60 and 52 percent, respectively, successfully solved the problem. Forty to 47 percent of students in Armenia, the Russian Federation, Singapore, Israel, and Lebanon also solved this item correctly, though internationally, on average, only 17 percent of the eighth grade students were able to do so.

Advanced International Benchmark

625

Summary

Students can reason with information, draw conclusions, make generalizations, and solve linear equations. Students can solve a variety of fraction, proportion, and percent problems and justify their conclusions. Students can express generalizations algebraically and model situations. They can solve a variety of problems involving equations, formulas, and functions. Students can reason with geometric figures to solve problems. Students can reason with data from several sources or unfamiliar representations to solve multi-step problems.

Students can solve a variety of fraction, proportion, and percent problems and justify their conclusions. They can reason with different types of numbers, including whole numbers, negative numbers, fractions, and percentages in abstract and non-routine situations. For example, given two points on a number line representing unspecified fractions, students can identify the point that represents their product.

Students can express generalizations either algebraically or in words. For example, they can express the *n*th term in number patterns. They can write algebraic expressions that model situations in word problems and geometric figures. They can add three simple algebraic expressions with different numerical denominators, subtract expressions, and identify the sum of three consecutive whole numbers given the middle number represented algebraically.

They can solve a variety of problems involving equations, formulas, and functions. For example, they can solve a linear inequality involving fractions, solve linear equations with negative terms, and solve a pair of simultaneous linear equations. They can write an equation to model a situation and solve it. They can identify the linear equation that is satisfied by two ordered pairs or shown graphically. They demonstrate an understanding of slope.

Students can reason with geometric figures to solve problems involving parallel lines, similar triangles, the sum of angles in a triangle, and interior and exterior angles. They also can use their knowledge of geometric figures to solve a wide range of problems about area and volume. For example, they can find the area of a trapezoid inscribed in a rectangle and solve a multi-step word problem involving ratios between volumes. They can use the Pythagorean theorem to find the area of a triangle and the perimeter of a trapezoid. Students can solve distance problems about points on a line or on a coordinate grid.

Students can reason with data from several sources or unfamiliar representations to solve multi-step problems. They demonstrate understanding of the meaning of averages. Students can extrapolate data from a graph and explain why a data representation can be misleading.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 2.32: Advanced International Benchmark – Example Item 8

Country	Percent Correct	
Chinese Taipei	53 (2.0)	▲
Hong Kong SAR	47 (2.5)	▲
2 Singapore	45 (2.0)	▲
Korea, Rep. of	44 (2.0)	▲
Japan	43 (2.1)	▲
2 Russian Federation	31 (2.1)	▲
Sweden	30 (1.8)	▲
‡ England	29 (3.0)	▲
Finland	29 (2.0)	▲
Palestinian Nat'l Auth.	28 (1.8)	▲
3 Israel	27 (2.0)	▲
Oman	26 (1.5)	▲
Syrian Arab Republic	25 (2.2)	
Saudi Arabia	25 (1.9)	
Jordan	24 (1.6)	
Australia	23 (2.1)	
Hungary	23 (1.6)	
International Avg.	23 (0.3)	
2 United States	22 (1.5)	
Qatar	22 (2.2)	
Slovenia	21 (1.9)	
Bahrain	21 (1.9)	
New Zealand	19 (2.3)	
Ukraine	19 (2.0)	▼
Lebanon	18 (2.0)	▼
Malaysia	18 (1.4)	▼
1 Lithuania	18 (1.8)	▼
Macedonia, Rep. of	17 (2.4)	▼
Iran, Islamic Rep. of	16 (1.2)	▼
Morocco	16 (1.2)	▼
Italy	16 (1.6)	▼
Norway	15 (1.8)	▼
Armenia	15 (1.7)	▼
United Arab Emirates	15 (0.9)	▼
Turkey	15 (1.4)	▼
Tunisia	14 (1.4)	▼
Kazakhstan	14 (1.8)	▼
Chile	14 (1.3)	▼
1 Georgia	13 (1.7)	▼
Ghana	13 (1.1)	▼
Romania	12 (1.6)	▼
Thailand	12 (1.5)	▼
Indonesia	10 (1.7)	▼

Content Domain: Number

Cognitive Domain: Reasoning

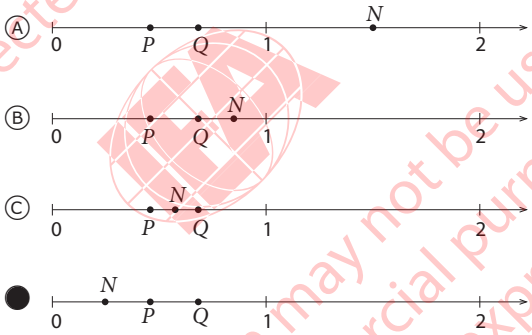
Description: Given two points on a number line representing unspecified fractions, identifies the point that represents their product



P and Q represent two fractions on the number line above.

$P \times Q = N$.

Which of these shows the location of N on the number line?



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Country	Percent Correct	
Ninth Grade Participants		
Botswana	13 (1.2)	▼
South Africa	10 (0.9)	▼
2 Honduras	8 (1.2)	▼

Country	Percent Correct	
Benchmarking Participants		
1 2 Massachusetts, US	44 (4.0)	▲
1 Minnesota, US	38 (3.1)	▲
1 3 North Carolina, US	36 (4.1)	▲
1 2 Connecticut, US	30 (3.1)	▲
Quebec, Canada	29 (1.8)	▲
2 Ontario, Canada	27 (2.0)	▲
2 Alberta, Canada	24 (1.9)	
1 Colorado, US	21 (2.4)	
1 2 Florida, US	20 (2.5)	
1 2 California, US	19 (2.0)	
1 2 Indiana, US	19 (2.7)	
Abu Dhabi, UAE	16 (1.9)	▼
Dubai, UAE	14 (1.4)	▼
1 Alabama, US	13 (2.1)	▼

▲ Percent significantly higher than international average

▼ Percent significantly lower than international average

See Appendix C.3 for target population coverage notes 1, 2, and 3. See Appendix C.9 for sampling guidelines and sampling participation notes †, ‡, and ‡.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 2.33: Advanced International Benchmark – Example Item 9

Country	Percent Full Credit	
Chinese Taipei	66 (1.8)	▲
Hong Kong SAR	65 (2.1)	▲
Korea, Rep. of	62 (2.0)	▲
2 Singapore	60 (1.9)	▲
Japan	58 (1.8)	▲
2 Russian Federation	36 (2.6)	▲
3 Israel	34 (2.4)	▲
Kazakhstan	33 (2.5)	▲
1 Lithuania	30 (2.0)	▲
Australia	29 (2.3)	▲
Finland	29 (2.3)	
Malaysia	28 (2.1)	
Slovenia	28 (2.6)	
New Zealand	27 (2.3)	
‡ England	26 (2.3)	
2 United States	26 (1.5)	
Armenia	25 (2.1)	
International Avg.	25 (0.3)	
Ukraine	23 (2.7)	
Norway	22 (2.0)	
Italy	22 (2.1)	
Romania	22 (2.1)	
Hungary	21 (1.7)	▼
Sweden	20 (1.6)	▼
United Arab Emirates	20 (1.3)	▼
Turkey	20 (1.5)	▼
Thailand	16 (1.5)	▼
Chile	16 (1.5)	▼
Macedonia, Rep. of	16 (2.0)	▼
1 Georgia	15 (1.7)	▼
Palestinian Nat'l Auth.	14 (1.7)	▼
Bahrain	14 (1.5)	▼
Iran, Islamic Rep. of	14 (1.6)	▼
Qatar	13 (1.5)	▼
Tunisia	12 (1.5)	▼
Saudi Arabia	12 (1.7)	▼
Indonesia	11 (1.5)	▼
Oman	11 (0.9)	▼
Lebanon	11 (1.8)	▼
Jordan	9 (0.9)	▼
Syrian Arab Republic	9 (1.5)	▼
Morocco	8 (1.0)	▼
Ghana	4 (1.0)	▼

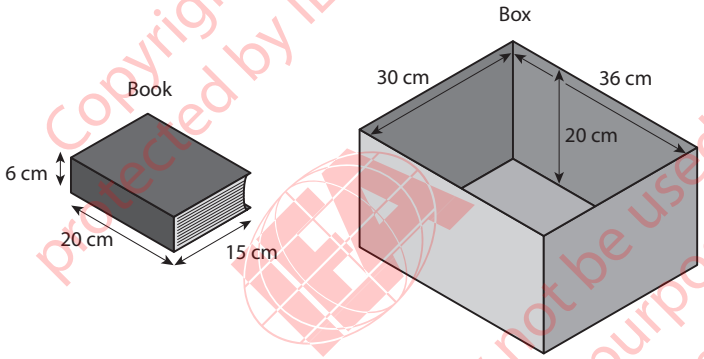
Content Domain: Geometry

Cognitive Domain: Reasoning

Description: Solves a word problem involving filling a three-dimensional shape with rectangular solids

Ryan is packing books into a rectangular box.

All the books are the same size.



What is the largest number of books that will fit inside the box?

Answer: 12

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The answer shown illustrates the type of student response that was given 1 of 1 points.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Country	Percent Full Credit	
Ninth Grade Participants		
Botswana	7 (1.1)	▼
2 Honduras	7 (1.2)	▼
South Africa	4 (0.5)	▼

Country	Percent Full Credit	
Benchmarking Participants		
1 2 Massachusetts, US	49 (3.2)	▲
1 3 North Carolina, US	46 (3.6)	▲
1 2 Indiana, US	45 (3.6)	▲
2 Ontario, Canada	39 (2.4)	▲
2 Alberta, Canada	39 (2.4)	▲
1 Minnesota, US	36 (3.2)	▲
Quebec, Canada	34 (2.1)	▲
1 2 Connecticut, US	33 (3.3)	▲
1 Colorado, US	32 (3.9)	
1 2 Florida, US	32 (3.6)	▲
Dubai, UAE	26 (2.0)	
1 2 California, US	22 (2.7)	
Abu Dhabi, UAE	19 (1.9)	▼
1 Alabama, US	18 (2.2)	▼

▲ Percent significantly higher than international average

▼ Percent significantly lower than international average

See Appendix C.3 for target population coverage notes 1, 2, and 3. See Appendix C.9 for sampling guidelines and sampling participation notes †, ‡, and ‡.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Exhibit 2.34: Advanced International Benchmark – Example Item 10

Country	Percent Full Credit	
Korea, Rep. of	60 (2.3)	▲
Chinese Taipei	52 (2.0)	▲
Armenia	47 (2.5)	▲
2 Russian Federation	46 (3.0)	▲
2 Singapore	44 (1.9)	▲
3 Israel	41 (2.5)	▲
Lebanon	40 (3.0)	▲
Hungary	38 (2.3)	▲
Kazakhstan	38 (2.6)	▲
Romania	34 (2.4)	▲
Macedonia, Rep. of	26 (2.9)	▲
1 Georgia	23 (2.1)	▲
1 Lithuania	23 (1.9)	▲
2 United States	21 (1.6)	▲
International Avg.	17 (0.3)	
Hong Kong SAR	16 (2.0)	
Oman	15 (1.4)	
Bahrain	13 (1.1)	▼
Ghana	13 (1.6)	▼
Morocco	13 (1.2)	▼
Turkey	10 (1.3)	▼
Japan	9 (1.2)	▼
Jordan	9 (1.0)	▼
Finland	8 (1.4)	▼
Australia	8 (1.7)	▼
United Arab Emirates	7 (0.8)	▼
Syrian Arab Republic	7 (1.2)	▼
Qatar	6 (1.3)	▼
Ukraine	6 (1.7)	▼
‡ England	5 (1.3)	▼
Italy	5 (0.9)	▼
Palestinian Nat'l Auth.	4 (0.9)	▼
Saudi Arabia	4 (1.0)	▼
Indonesia	3 (1.1)	▼
Malaysia	3 (0.8)	▼
New Zealand	2 (0.9)	▼
Thailand	2 (0.5)	▼
Slovenia	2 (0.8)	▼
Norway	1 (0.5)	▼
Tunisia	1 (0.6)	▼
Chile	1 (0.2)	▼
Iran, Islamic Rep. of	0 (0.2)	▼
Sweden	– –	

Content Domain: Algebra

Cognitive Domain: Knowing

Description: Solves a linear inequality

Solve this inequality.

$9x - 6 < 4x + 4$

Answer: $x < 2$

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The answer shown illustrates the type of student response that was given 1 of 1 points.

Country	Percent Full Credit	
Ninth Grade Participants		
2 Honduras	3 (1.4)	▼
Botswana	1 (0.4)	▼
South Africa	1 (0.2)	▼

Country	Percent Full Credit	
Benchmarking Participants		
1 3 North Carolina, US	38 (4.4)	▲
1 2 California, US	35 (3.8)	▲
1 Minnesota, US	33 (3.2)	▲
1 2 Massachusetts, US	33 (4.8)	▲
1 2 Indiana, US	33 (3.4)	▲
1 2 Connecticut, US	22 (2.4)	▲
1 2 Florida, US	19 (3.2)	
1 Colorado, US	13 (2.3)	
Dubai, UAE	10 (1.1)	▼
1 Alabama, US	9 (2.0)	▼
Abu Dhabi, UAE	8 (1.5)	▼
Quebec, Canada	1 (0.4)	▼
2 Ontario, Canada	1 (0.3)	▼
2 Alberta, Canada	0 (0.2)	▼

▲ Percent significantly higher than international average

▼ Percent significantly lower than international average

See Appendix C.3 for target population coverage notes 1, 2, and 3. See Appendix C.9 for sampling guidelines and sampling participation notes †, ‡, and ‡.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A dash (–) indicates comparable data not available.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Chapter 3



International Student Achievement in the TIMSS Mathematics Content and Cognitive Domains

Generally, TIMSS 2011 participants with the highest achievement overall also had the highest achievement in the mathematics content domains (e.g., number and algebra). Internationally, the fewest countries showed relative strength in geometry. Also, more countries demonstrated relative strengths in knowing mathematics than in applying and reasoning.

As described in the *TIMSS 2011 Assessment Frameworks*, the mathematics assessment is organized around two dimensions: a content dimension specifying the subject matter or content domains to be assessed in mathematics, and a cognitive dimension specifying the thinking processes that students are likely to use as they engage with the content. Each item in the mathematics assessment is associated with one content domain and one cognitive domain, providing for both content-based and cognitive-oriented perspectives on student achievement in mathematics.

There are three content domains at the fourth grade: number, geometric shapes and measures, and data display; and there are four domains at the eighth grade: number, algebra, geometry, and data and chance. The same three cognitive domains—knowing, applying, and reasoning—were used at both the fourth and eighth grades. Knowing refers to the student's knowledge base of mathematics facts, concepts, tools, and procedures. Applying focuses on the student's ability to apply knowledge and conceptual understanding in a problem situation. Reasoning goes beyond the solution of routine problems to encompass unfamiliar situations, complex contexts, and multi-step problems.

Chapter 3 presents the TIMSS 2011 results at the fourth and eighth grades for the content and cognitive domains. Previous TIMSS assessments have found that most countries performed relatively better in one or other of the content domains; and similarly, that countries can have relative strengths in one cognitive domain compared to another. In addition to providing TIMSS 2011 average achievement for the content and cognitive domains, the chapter provides changes in achievement in the domains compared to TIMSS 2007, and achievement differences by gender.

Relative Achievement by Mathematics Content Domains

Exhibit 3.1 presents the average achievement for TIMSS 2011 participants in the fourth grade content domains of number, geometric shapes and measures, and data display relative to overall fourth grade mathematics achievement. To provide a way for the TIMSS 2011 participants to examine relative performance in the content domains, IRT scaling was used to place achievement in each of the three domains on the TIMSS fourth grade mathematics scale. The items on which the content domains were based varied in difficulty, as shown in Appendix E, which contains the average percent correct across the items on each domain. For example, the fourth grade students found the number and geometric shapes and measures items (47% and 49% correct, on average)

somewhat more difficult than the data display items (58%). There was also some variation in the difficulty of the eighth grade content domains, with algebra most difficult (37% correct, on average), followed by geometry (39%), number (43%), and data and chance (45%). However, the scaling process took the differences in difficulty into account, so that average achievement for each of the content domains can be compared relative to overall mathematics achievement at each grade level.

In Exhibit 3.1, the first column presents average overall mathematics achievement for each participant in the TIMSS 2011 fourth grade assessment, followed by average achievement in the three content domains of number, geometric shapes and measures, and data display. The participants are presented in order by overall mathematics achievement, first for the fourth grade followed by the sixth grade, and the benchmarking participants. The average scale score for each content domain is shown, together with the difference between achievement in overall mathematics and achievement in the content domain. Up and down arrows are used to indicate whether a country's average content domain score is significantly higher or lower than its overall mathematics average score.

Generally, the TIMSS 2011 participants with the highest achievement overall also had the highest achievement in the content domains. However, many countries performed relatively higher in one or two of the content domains compared to their overall performance; and relatively lower in one or two others. For example, among the top-performing countries, Singapore performed relatively better in number than in mathematics overall, and relatively less well in geometric shapes and measures and data display, while Korea performed equally well in all three domains. Hong Kong SAR and Chinese Taipei also performed relatively better in number than in mathematics overall, but Hong Kong performed relatively better in geometric shapes and measures and less well in data display while Chinese Taipei did relatively better in data display and less well in geometric shapes and measures. Looking across the results in Exhibit 3.1, there is considerable diversity among countries with relative strengths and weaknesses in the content domains. It is noteworthy that countries with lower average mathematics achievement tended to perform relatively better in number than in mathematics overall, and relatively less well in geometric shapes and measures.

Exhibit 3.2 presents average achievement in the eighth grade content domains of number, algebra, geometry, and data and chance. Similar to the

Exhibit 3.1: Achievement in Mathematics Content Domains

TIMSS 2011 Mathematics 4th Grade

Country	Overall Mathematics Average Scale Score	Number		Geometric Shapes and Measures		Data Display	
		Average Scale Score	Difference from Overall Mathematics Score	Average Scale Score	Difference from Overall Mathematics Score	Average Scale Score	Difference from Overall Mathematics Score
[2] Singapore	606 (3.2)	619 (3.4)	13 (0.8) ▲	589 (3.6)	−17 (1.5) ▼	588 (3.4)	−18 (1.7) ▼
Korea, Rep. of	605 (1.9)	606 (2.0)	1 (1.6)	607 (1.7)	2 (1.4)	603 (1.9)	−2 (2.0)
[2] Hong Kong SAR	602 (3.4)	604 (3.3)	3 (1.0) ▲	605 (3.4)	3 (0.9) ▲	593 (3.6)	−8 (2.1) ▼
Chinese Taipei	591 (2.0)	599 (2.0)	8 (1.2) ▲	573 (2.1)	−19 (1.3) ▼	600 (2.6)	9 (1.6) ▲
Japan	585 (1.7)	584 (1.6)	−1 (0.9)	589 (2.0)	4 (1.1) ▲	590 (2.9)	4 (2.9)
† Northern Ireland	562 (2.9)	566 (2.9)	4 (1.6) ▲	560 (3.3)	−2 (2.1)	555 (3.0)	−8 (1.5) ▼
Belgium (Flemish)	549 (1.9)	552 (2.2)	2 (1.4)	552 (2.0)	3 (1.0) ▲	536 (3.0)	−13 (2.0) ▼
Finland	545 (2.3)	545 (2.3)	0 (0.9)	543 (2.9)	−2 (2.2)	551 (3.5)	5 (3.2)
England	542 (3.5)	539 (3.7)	−3 (1.1) ▼	545 (3.9)	3 (1.6)	549 (4.6)	7 (2.9) ▲
Russian Federation	542 (3.7)	545 (3.3)	3 (1.4) ▲	542 (4.3)	−1 (1.5)	533 (4.1)	−9 (2.3) ▼
[2] United States	541 (1.8)	543 (2.0)	2 (0.9) ▲	535 (2.2)	−6 (0.8) ▼	545 (1.8)	4 (1.1) ▲
† Netherlands	540 (1.7)	543 (1.7)	3 (1.1) ▲	524 (2.9)	−16 (2.6) ▼	559 (2.9)	19 (1.7) ▲
[2] Denmark	537 (2.6)	534 (2.4)	−3 (0.9) ▼	548 (3.0)	11 (2.0) ▲	532 (3.0)	−5 (1.5) ▼
[1] [2] Lithuania	534 (2.4)	537 (2.4)	4 (1.1) ▲	531 (3.0)	−3 (1.9)	526 (3.0)	−7 (2.0) ▼
Portugal	532 (3.4)	522 (3.7)	−10 (1.6) ▼	548 (4.4)	16 (2.2) ▲	548 (2.8)	16 (2.0) ▲
Germany	528 (2.2)	520 (2.3)	−8 (0.7) ▼	536 (2.6)	8 (1.1) ▲	546 (2.8)	18 (1.6) ▲
Ireland	527 (2.6)	533 (2.6)	5 (1.4) ▲	520 (3.1)	−7 (1.6) ▼	523 (2.8)	−4 (2.0) ▼
[2] Serbia	516 (3.0)	529 (3.0)	13 (1.4) ▲	497 (3.8)	−19 (1.6) ▼	503 (3.8)	−13 (2.0) ▼
Australia	516 (2.9)	508 (3.2)	−8 (1.0) ▼	534 (3.0)	18 (1.6) ▲	515 (3.1)	−1 (2.2)
Hungary	515 (3.4)	515 (3.2)	0 (1.2)	520 (3.6)	5 (1.3) ▲	510 (4.2)	−5 (1.7) ▼
Slovenia	513 (2.2)	503 (2.7)	−10 (2.0) ▼	526 (2.3)	13 (1.6) ▲	532 (2.6)	19 (1.8) ▲
Czech Republic	511 (2.4)	509 (2.5)	−2 (1.3)	513 (3.0)	2 (1.4)	519 (3.1)	8 (1.4) ▲
Austria	508 (2.6)	506 (2.5)	−2 (1.1)	512 (3.4)	4 (1.4) ▲	515 (3.1)	7 (1.6) ▲
Italy	508 (2.6)	510 (2.7)	2 (1.6)	513 (3.1)	5 (1.0) ▲	495 (3.1)	−13 (1.8) ▼
Slovak Republic	507 (3.8)	511 (3.7)	5 (1.5) ▲	500 (4.3)	−7 (1.5) ▼	504 (4.6)	−3 (2.1)
Sweden	504 (2.0)	500 (2.2)	−4 (0.8) ▼	500 (2.4)	−4 (1.3) ▼	523 (3.0)	20 (1.9) ▲
[2] Kazakhstan	501 (4.5)	515 (4.1)	14 (1.1) ▲	491 (5.3)	−10 (1.8) ▼	476 (5.7)	−25 (1.9) ▼
Malta	496 (1.3)	498 (1.9)	2 (1.7)	487 (1.5)	−9 (1.5) ▼	498 (1.6)	2 (2.0)
‡ Norway	495 (2.8)	488 (3.1)	−7 (1.9) ▼	507 (3.0)	12 (1.7) ▲	494 (3.2)	−1 (2.3)
[2] Croatia	490 (1.9)	491 (1.8)	1 (0.9)	490 (2.5)	0 (1.3)	488 (2.7)	−2 (2.1)
New Zealand	486 (2.6)	483 (2.5)	−3 (0.8) ▼	483 (2.5)	−3 (1.5) ▼	491 (2.7)	5 (1.2) ▲
Spain	482 (2.9)	487 (3.0)	4 (1.1) ▲	476 (3.0)	−6 (1.3) ▼	479 (3.6)	−3 (2.0)
Romania	482 (5.8)	497 (5.6)	15 (2.1) ▲	469 (5.7)	−14 (1.9) ▼	457 (6.8)	−26 (3.5) ▼
Poland	481 (2.2)	480 (2.2)	−1 (1.1)	475 (2.7)	−6 (1.3) ▼	489 (2.9)	7 (1.7) ▲
Turkey	469 (4.7)	477 (4.5)	7 (0.9) ▲	447 (5.0)	−22 (1.3) ▼	478 (5.2)	9 (1.4) ▲
[2] Azerbaijan	463 (5.8)	491 (5.3)	28 (1.3) ▲	437 (7.3)	−26 (2.1) ▼	407 (6.4)	−55 (1.9) ▼
Chile	462 (2.3)	462 (2.7)	0 (1.6)	455 (3.0)	−6 (1.5) ▼	465 (2.5)	4 (1.8) ▲
Thailand	458 (4.8)	464 (4.5)	6 (1.2) ▲	437 (5.6)	−21 (2.0) ▼	467 (5.1)	9 (2.5) ▲
Armenia	452 (3.5)	484 (3.2)	32 (1.4) ▲	424 (4.2)	−28 (1.7) ▼	386 (4.9)	−66 (2.8) ▼
[1] Georgia	450 (3.7)	473 (3.1)	23 (1.5) ▲	411 (4.3)	−39 (2.3) ▼	433 (4.0)	−18 (1.4) ▼
Bahrain	436 (3.3)	439 (3.0)	3 (1.1) ▲	422 (3.9)	−14 (2.5) ▼	442 (4.1)	6 (2.0) ▲
United Arab Emirates	434 (2.0)	438 (2.1)	4 (0.8) ▲	418 (2.3)	−16 (0.7) ▼	437 (1.9)	3 (1.1) ▲
Iran, Islamic Rep. of	431 (3.5)	440 (3.3)	9 (1.3) ▲	435 (3.9)	4 (1.3) ▲	397 (4.3)	−33 (2.0) ▼
[2] Qatar	413 (3.5)	417 (3.3)	4 (1.8) ▲	399 (3.9)	−14 (2.5) ▼	416 (4.6)	3 (3.2)
Saudi Arabia	410 (5.3)	410 (5.7)	0 (2.1)	404 (6.4)	−6 (2.7) ▼	403 (6.0)	−7 (4.2)
Ψ Oman	385 (2.9)	384 (3.1)	−1 (1.3)	376 (3.3)	−9 (1.4) ▼	381 (3.1)	−4 (1.5) ▼
Ψ Tunisia	359 (3.9)	390 (3.7)	31 (1.7) ▲	329 (4.6)	−30 (3.2) ▼	300 (5.5)	−60 (3.1) ▼
[1] ж Kuwait	342 (3.4)	333 (4.1)	−9 (2.4) ▼	321 (4.2)	−21 (2.8) ▼	347 (3.8)	5 (2.2) ▲
ж Morocco	335 (4.0)	340 (3.8)	6 (2.5) ▲	350 (4.0)	15 (1.5) ▲	271 (4.7)	−64 (1.7) ▼
ж Yemen	248 (6.0)	261 (6.4)	13 (2.7) ▲	193 (6.5)	−55 (2.9) ▼	204 (6.0)	−44 (2.2) ▼

▲ Subscale score significantly higher than overall mathematics score

▼ Subscale score significantly lower than overall mathematics score

ж Average achievement not reliably measured because the percentage of students with achievement too low for estimation exceeds 25%.

Ψ Reservations about reliability of average achievement because the percentage of students with achievement too low for estimation does not exceed 25% but exceeds 15%.

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 3.1: Achievement in Mathematics Content Domains (Continued)

Country	Overall Mathematics Average Scale Score	Number		Geometric Shapes and Measures		Data Display	
		Average Scale Score	Difference from Overall Mathematics Score	Average Scale Score	Difference from Overall Mathematics Score	Average Scale Score	Difference from Overall Mathematics Score
Sixth Grade Participants							
Botswana	419 (3.7)	421 (3.7)	2 (1.3)	404 (4.4)	−15 (2.0) ▼	427 (4.0)	8 (1.9) ▲
Ψ Honduras	396 (5.5)	418 (4.9)	21 (2.6) ▲	365 (5.9)	−31 (2.1) ▼	377 (6.6)	−20 (1.9) ▼
Ж Yemen	348 (5.7)	367 (5.5)	19 (1.6) ▲	304 (6.3)	−44 (2.7) ▼	337 (6.0)	−11 (1.7) ▼
Benchmarking Participants							
1 2 North Carolina, US	554 (4.2)	564 (4.0)	10 (2.0) ▲	536 (5.0)	−18 (1.8) ▼	558 (5.2)	4 (4.0)
1 3 Florida, US	545 (2.9)	548 (3.2)	3 (1.1) ▲	546 (3.8)	0 (2.5)	541 (3.4)	−4 (2.2)
Quebec, Canada	533 (2.4)	531 (2.6)	−1 (1.2)	536 (3.2)	3 (1.6) ▲	538 (3.7)	5 (3.1)
Ontario, Canada	518 (3.1)	504 (3.4)	−14 (1.0) ▼	535 (3.4)	17 (1.9) ▲	536 (3.5)	18 (2.1) ▲
2 Alberta, Canada	507 (2.5)	505 (2.7)	−1 (1.1)	496 (2.6)	−11 (1.2) ▼	524 (3.1)	17 (1.9) ▲
Dubai, UAE	468 (1.6)	474 (1.7)	6 (1.0) ▲	449 (2.3)	−19 (1.5) ▼	471 (3.1)	3 (2.6)
Abu Dhabi, UAE	417 (4.6)	420 (4.7)	3 (1.9)	401 (5.3)	−16 (1.7) ▼	418 (4.3)	1 (1.6)

▲ Subscale score significantly higher than overall mathematics score

▼ Subscale score significantly lower than overall mathematics score

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 3.2: Achievement in Mathematics Content Domains

TIMSS 2011 Mathematics 8th Grade

Country	Overall Mathematics Average Scale Score	Number		Algebra	
		Average Scale Score	Difference from Overall Mathematics Score	Average Scale Score	Difference from Overall Mathematics Score
Korea, Rep. of	613 (2.9)	618 (2.6)	5 (1.2) ▲	617 (3.2)	4 (1.6) ▲
[2] Singapore	611 (3.8)	611 (3.6)	0 (1.4)	614 (4.1)	3 (0.9) ▲
Chinese Taipei	609 (3.2)	598 (3.1)	−12 (1.0) ▼	628 (3.8)	19 (1.5) ▲
Hong Kong SAR	586 (3.8)	588 (3.7)	2 (1.2) ▲	583 (3.9)	−3 (1.2) ▼
Japan	570 (2.6)	557 (3.0)	−13 (1.6) ▼	570 (3.0)	0 (1.6)
[2] Russian Federation	539 (3.6)	534 (3.2)	−5 (1.0) ▼	556 (3.7)	17 (1.7) ▲
[3] Israel	516 (4.1)	518 (4.0)	2 (1.1)	521 (4.7)	5 (1.7) ▲
Finland	514 (2.5)	527 (2.4)	13 (1.1) ▲	492 (2.9)	−22 (1.5) ▼
[2] United States	509 (2.6)	514 (3.0)	4 (1.0) ▲	512 (2.6)	2 (1.0) ▲
‡ England	507 (5.5)	512 (5.8)	5 (1.4) ▲	489 (5.7)	−17 (1.5) ▼
Hungary	505 (3.5)	510 (3.9)	5 (1.1) ▲	496 (4.0)	−8 (1.8) ▼
Australia	505 (5.1)	513 (5.4)	8 (0.9) ▲	489 (5.3)	−16 (1.6) ▼
Slovenia	505 (2.2)	511 (2.5)	6 (1.1) ▲	493 (2.6)	−12 (1.8) ▼
[1] Lithuania	502 (2.5)	501 (2.5)	−1 (1.5)	492 (2.8)	−10 (1.5) ▼
Italy	498 (2.4)	496 (2.9)	−2 (1.7)	491 (2.7)	−8 (1.3) ▼
New Zealand	488 (5.5)	492 (5.9)	5 (1.2) ▲	472 (5.5)	−16 (1.2) ▼
Kazakhstan	487 (4.0)	479 (4.0)	−8 (1.8) ▼	506 (4.4)	19 (1.4) ▲
Sweden	484 (1.9)	504 (1.8)	19 (1.0) ▲	459 (2.2)	−26 (1.2) ▼
Ukraine	479 (3.9)	472 (4.1)	−7 (1.8) ▼	487 (4.4)	8 (1.6) ▲
Norway	475 (2.4)	492 (2.8)	18 (1.1) ▲	432 (2.7)	−43 (1.3) ▼
Armenia	467 (2.7)	474 (2.4)	7 (1.0) ▲	496 (2.8)	29 (1.1) ▲
Romania	458 (4.0)	448 (4.1)	−10 (1.7) ▼	477 (4.3)	19 (1.6) ▲
United Arab Emirates	456 (2.1)	459 (2.2)	3 (0.8) ▲	468 (2.2)	12 (1.3) ▲
Turkey	452 (3.9)	435 (3.9)	−18 (1.5) ▼	455 (4.2)	2 (1.2) ▲
Lebanon	449 (3.7)	451 (3.8)	2 (1.9)	471 (3.8)	22 (1.5) ▲
Malaysia	440 (5.4)	451 (5.8)	11 (1.2) ▲	430 (5.2)	−10 (1.3) ▼
[1] Georgia	431 (3.8)	435 (3.5)	4 (1.5) ▲	450 (3.8)	19 (1.6) ▲
Thailand	427 (4.3)	425 (4.6)	−2 (1.0) ▼	425 (4.3)	−2 (1.2)
Ψ Macedonia, Rep. of	426 (5.2)	418 (5.1)	−8 (2.3) ▼	448 (5.3)	22 (2.3) ▲
Tunisia	425 (2.8)	431 (2.8)	6 (1.8) ▲	419 (2.9)	−6 (1.7) ▼
Chile	416 (2.6)	413 (2.9)	−4 (1.2) ▼	403 (3.6)	−14 (2.1) ▼
Ψ Iran, Islamic Rep. of	415 (4.3)	402 (4.9)	−13 (2.7) ▼	422 (4.3)	7 (1.9) ▲
Ψ Qatar	410 (3.1)	408 (3.4)	−1 (1.9)	425 (2.8)	15 (1.9) ▲
Ψ Bahrain	409 (2.0)	397 (1.7)	−13 (1.4) ▼	424 (1.7)	15 (1.2) ▲
Ψ Jordan	406 (3.7)	390 (3.8)	−15 (1.4) ▼	432 (3.9)	26 (1.1) ▲
Ψ Palestinian Nat'l Auth.	404 (3.5)	400 (3.4)	−5 (1.2) ▼	419 (3.3)	14 (1.6) ▲
Ψ Saudi Arabia	394 (4.6)	393 (4.8)	−1 (1.9)	399 (4.9)	6 (1.3) ▲
Ψ Indonesia	386 (4.3)	375 (4.8)	−11 (2.0) ▼	392 (3.8)	6 (1.3) ▲
Ψ Syrian Arab Republic	380 (4.5)	373 (4.0)	−7 (1.8) ▼	391 (4.9)	11 (2.8) ▲
⁂ Morocco	371 (2.0)	379 (2.6)	8 (1.3) ▲	357 (2.7)	−15 (1.6) ▼
Ψ Oman	366 (2.8)	351 (3.0)	−16 (1.9) ▼	383 (2.8)	17 (1.4) ▲
⁂ Ghana	331 (4.3)	321 (4.5)	−10 (1.8) ▼	358 (4.0)	28 (2.1) ▲

▲ Subscale score significantly higher than overall mathematics score

▼ Subscale score significantly lower than overall mathematics score

⁂ Average achievement not reliably measured because the percentage of students with achievement too low for estimation exceeds 25%.

Ψ Reservations about reliability of average achievement because the percentage of students with achievement too low for estimation does not exceed 25% but exceeds 15%.

See Appendix C.3 for target population coverage notes 1, 2, and 3. See Appendix C.9 for sampling guidelines and sampling participation notes †, ‡, and ‡.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 3.2: Achievement in Mathematics Content Domains (Continued)

Country	Geometry			Data and Chance		
	Average Scale Score	Difference from Overall Mathematics Score		Average Scale Score	Difference from Overall Mathematics Score	
Korea, Rep. of	612 (2.7)	–1 (2.0)		616 (2.5)	3 (1.4)	▲
[2] Singapore	609 (3.9)	–2 (1.9)		607 (4.4)	–4 (1.3)	▼
Chinese Taipei	625 (3.7)	16 (1.3)	▲	584 (3.0)	–25 (1.7)	▼
Hong Kong SAR	597 (4.3)	12 (1.3)	▲	581 (4.1)	–4 (1.6)	▼
Japan	586 (3.5)	16 (2.4)	▲	579 (3.0)	10 (2.5)	▲
[2] Russian Federation	533 (4.0)	–6 (1.8)	▼	511 (3.9)	–28 (1.6)	▼
[3] Israel	496 (4.6)	–20 (1.6)	▼	515 (4.8)	0 (2.1)	
Finland	502 (2.9)	–12 (1.2)	▼	542 (3.1)	28 (2.1)	▲
[2] United States	485 (2.7)	–25 (0.7)	▼	527 (3.3)	18 (1.1)	▲
[‡] England	498 (5.7)	–9 (2.7)	▼	543 (6.8)	36 (2.8)	▲
Hungary	501 (4.1)	–3 (2.2)		517 (4.3)	12 (2.3)	▲
Australia	499 (5.4)	–6 (1.7)	▼	534 (5.9)	30 (1.8)	▲
Slovenia	504 (3.1)	–1 (2.0)		518 (3.3)	13 (2.1)	▲
[1] Lithuania	500 (3.1)	–3 (1.2)	▼	515 (2.8)	13 (2.2)	▲
Italy	512 (3.5)	14 (2.5)	▲	499 (3.2)	1 (2.3)	
New Zealand	483 (5.5)	–5 (2.1)	▼	513 (6.7)	26 (2.9)	▲
Kazakhstan	491 (4.4)	4 (1.4)	▲	444 (4.5)	–43 (1.6)	▼
Sweden	456 (2.3)	–28 (1.3)	▼	504 (2.7)	20 (1.2)	▲
Ukraine	476 (4.3)	–3 (1.6)	▼	471 (4.0)	–8 (2.2)	▼
Norway	461 (3.5)	–14 (1.8)	▼	513 (3.6)	39 (2.6)	▲
Armenia	450 (3.3)	–16 (1.7)	▼	376 (3.7)	–90 (1.8)	▼
Romania	453 (4.5)	–5 (1.5)	▼	429 (4.0)	–29 (1.2)	▼
United Arab Emirates	431 (2.4)	–25 (1.1)	▼	440 (2.4)	–15 (0.6)	▼
Turkey	454 (4.3)	2 (1.5)		467 (4.0)	15 (1.5)	▲
Lebanon	447 (3.8)	–2 (2.1)		393 (5.2)	–56 (2.5)	▼
Malaysia	432 (6.4)	–8 (1.5)	▼	429 (5.3)	–11 (1.2)	▼
[1] Georgia	406 (4.2)	–25 (2.2)	▼	392 (4.5)	–39 (2.3)	▼
Thailand	415 (5.4)	–12 (2.8)	▼	431 (4.1)	3 (1.9)	
[Ψ] Macedonia, Rep. of	419 (6.0)	–7 (2.4)	▼	389 (5.9)	–37 (3.6)	▼
Tunisia	426 (3.2)	1 (1.4)		398 (3.3)	–27 (1.7)	▼
Chile	419 (3.1)	3 (2.2)		426 (3.1)	9 (1.8)	▲
[Ψ] Iran, Islamic Rep. of	437 (4.8)	22 (2.6)	▲	393 (4.9)	–22 (3.0)	▼
[Ψ] Qatar	387 (3.6)	–22 (2.6)	▼	390 (3.6)	–20 (1.7)	▼
[Ψ] Bahrain	398 (2.6)	–11 (1.9)	▼	407 (2.6)	–2 (2.1)	
[Ψ] Jordan	407 (3.7)	1 (1.1)		379 (3.7)	–26 (1.5)	▼
[Ψ] Palestinian Nat'l Auth.	416 (3.6)	12 (1.8)	▲	368 (3.6)	–36 (1.3)	▼
[Ψ] Saudi Arabia	364 (5.3)	–30 (2.0)	▼	387 (5.1)	–7 (2.7)	▼
[Ψ] Indonesia	377 (5.3)	–9 (2.3)	▼	376 (4.8)	–10 (2.2)	▼
[Ψ] Syrian Arab Republic	386 (5.0)	6 (2.5)	▲	343 (4.7)	–37 (1.8)	▼
[Ж] Morocco	390 (2.5)	19 (2.1)	▲	332 (2.0)	–39 (1.7)	▼
[Ψ] Oman	377 (2.7)	11 (1.4)	▲	342 (3.1)	–24 (2.0)	▼
[Ж] Ghana	315 (4.3)	–16 (2.2)	▼	296 (4.5)	–35 (1.7)	▼

▲ Subscale score significantly higher than overall mathematics score

▼ Subscale score significantly lower than overall mathematics score

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 3.2: Achievement in Mathematics Content Domains (Continued)

TIMSS 2011 Mathematics 8th Grade

Country	Overall Mathematics Average Scale Score	Number		Algebra	
		Average Scale Score	Difference from Overall Mathematics Score	Average Scale Score	Difference from Overall Mathematics Score
Ninth Grade Participants					
Ψ Botswana	397 (2.5)	392 (3.3)	−5 (1.6) ▼	407 (3.2)	10 (1.7) ▲
ж South Africa	352 (2.5)	359 (2.6)	7 (1.4) ▲	361 (2.5)	9 (1.3) ▲
2 ж Honduras	338 (3.7)	352 (3.5)	14 (2.2) ▲	327 (4.5)	−11 (2.8) ▼
Benchmarking Participants					
1 2 Massachusetts, US	561 (5.3)	567 (5.9)	7 (1.4) ▲	559 (5.6)	−1 (1.1)
1 Minnesota, US	545 (4.6)	556 (5.3)	11 (1.4) ▲	543 (4.9)	−2 (1.2)
1 3 North Carolina, US	537 (6.8)	547 (7.3)	10 (1.5) ▲	537 (6.8)	0 (1.6)
Quebec, Canada	532 (2.3)	543 (2.5)	11 (0.7) ▲	516 (2.9)	−16 (1.0) ▼
1 2 Indiana, US	522 (5.1)	528 (5.4)	6 (1.7) ▲	520 (5.3)	−2 (1.4)
1 Colorado, US	518 (4.9)	521 (5.1)	3 (2.0)	512 (5.1)	−6 (1.4) ▼
1 2 Connecticut, US	518 (4.8)	527 (4.9)	10 (1.8) ▲	510 (5.4)	−7 (1.7) ▼
1 2 Florida, US	513 (6.4)	517 (7.0)	4 (1.8) ▲	513 (6.4)	−1 (2.0)
2 Ontario, Canada	512 (2.5)	519 (2.6)	7 (1.3) ▲	497 (2.4)	−15 (0.8) ▼
2 Alberta, Canada	505 (2.6)	523 (3.0)	18 (1.1) ▲	485 (2.7)	−20 (1.4) ▼
1 2 California, US	493 (4.9)	492 (5.2)	0 (1.7)	509 (5.2)	17 (2.5) ▲
Dubai, UAE	478 (2.1)	479 (2.3)	2 (1.0)	489 (2.4)	11 (1.7) ▲
1 Alabama, US	466 (5.9)	463 (7.1)	−3 (2.6)	471 (5.3)	5 (1.6) ▲
Abu Dhabi, UAE	449 (3.7)	452 (3.8)	4 (1.0) ▲	459 (3.8)	10 (2.0) ▲

Country	Overall Mathematics Average Scale Score	Geometry		Data and Chance	
		Average Scale Score	Difference from Overall Mathematics Score	Average Scale Score	Difference from Overall Mathematics Score
Ninth Grade Participants					
Ψ Botswana	397 (2.5)	381 (3.0)	−16 (1.7) ▼	391 (3.2)	−6 (1.7) ▼
ж South Africa	352 (2.5)	315 (3.1)	−36 (2.1) ▼	333 (3.4)	−19 (1.7) ▼
2 ж Honduras	338 (3.7)	309 (4.1)	−29 (3.1) ▼	319 (5.0)	−19 (3.9) ▼
Benchmarking Participants					
1 2 Massachusetts, US	561 (5.3)	548 (5.5)	−13 (2.0) ▼	584 (7.3)	24 (2.6) ▲
1 Minnesota, US	545 (4.6)	515 (6.2)	−29 (2.9) ▼	571 (6.2)	26 (2.6) ▲
1 3 North Carolina, US	537 (6.8)	515 (8.1)	−22 (3.7) ▼	548 (8.3)	11 (2.9) ▲
Quebec, Canada	532 (2.3)	529 (2.7)	−3 (0.7) ▼	549 (2.8)	17 (1.2) ▲
1 2 Indiana, US	522 (5.1)	498 (5.3)	−23 (2.2) ▼	545 (6.0)	23 (2.9) ▲
1 Colorado, US	518 (4.9)	505 (5.7)	−13 (2.8) ▼	540 (5.7)	23 (1.9) ▲
1 2 Connecticut, US	518 (4.8)	490 (5.1)	−27 (2.3) ▼	546 (6.3)	29 (2.7) ▲
1 2 Florida, US	513 (6.4)	499 (6.8)	−14 (2.3) ▼	528 (9.0)	15 (3.5) ▲
2 Ontario, Canada	512 (2.5)	512 (2.7)	0 (1.7)	531 (4.1)	19 (2.4) ▲
2 Alberta, Canada	505 (2.6)	485 (3.0)	−21 (1.7) ▼	529 (3.8)	24 (1.9) ▲
1 2 California, US	493 (4.9)	454 (5.0)	−38 (1.8) ▼	495 (6.0)	2 (2.4)
Dubai, UAE	478 (2.1)	453 (3.0)	−25 (2.0) ▼	468 (2.8)	−10 (1.9) ▼
1 Alabama, US	466 (5.9)	443 (6.0)	−23 (2.2) ▼	480 (7.9)	14 (4.0) ▲
Abu Dhabi, UAE	449 (3.7)	424 (4.4)	−25 (2.4) ▼	434 (4.3)	−15 (1.7) ▼

▲ Subscale score significantly higher than overall mathematics score

▼ Subscale score significantly lower than overall mathematics score

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

fourth grade, there is considerable diversity in countries' strengths and weaknesses in the content domains, even among the high-achieving Asian countries. For example, although the differences were small, Korea performed somewhat better in number, algebra, and data and chance than in mathematics overall, whereas Singapore performed better in algebra and less well in data and chance. Chinese Taipei had more pronounced achievement differences among the content domains, with achievement in algebra and geometry well above overall mathematics achievement, and number and data and chance well below (although still very high in comparison to most other countries). Hong Kong SAR and Japan present other configurations of relative strength, with Hong Kong performing relatively better in number and geometry and less well in algebra and data and chance, and Japan performing less well in number but better in geometry and data and chance than in mathematics overall. Looking across the countries participating at the eighth grade, many (25) had relatively higher achievement in algebra than they did overall, and fewer (only 10) had relatively higher achievement in geometry. At the ninth grade and among the benchmarking participants, there were some different patterns, in particular, with nine US states generally reflecting overall achievement in the United States. Nearly all of the ninth grade and Benchmarking participants had a relative weakness in geometry, but many showed relative strengths in number as well as data and chance.

Relative Achievement by Mathematics Cognitive Domains

Exhibits 3.3 and 3.4 present average achievement at the fourth and eighth grades, respectively, in the cognitive domains of knowing, applying, and reasoning relative to overall mathematics achievement for TIMSS 2011 participants. Because these three scales represent quite different skills, it was expected that the assessment items would have different difficulty levels. The average percent correct in the cognitive domains shown in Appendix E were 55 percent for knowing, 50 percent for applying, and 40 percent for reasoning at the fourth grade, and 49 percent, 39 percent, and 30 percent, respectively, at the eighth grade. However, as with the content domains, the IRT scaling adjusts for these difficulty levels in placing achievement in the three cognitive domains on the overall mathematics scales for the fourth and eighth grades, and allows each TIMSS 2011 participant to compare performance in the cognitive domains relative to overall mathematics achievement.

Exhibit 3.3: Achievement in Mathematics Cognitive Domains

TIMSS 2011 Mathematics 4th Grade

Country	Overall Mathematics Average Scale Score	Knowing		Applying		Reasoning	
		Average Scale Score	Difference from Overall Mathematics Score	Average Scale Score	Difference from Overall Mathematics Score	Average Scale Score	Difference from Overall Mathematics Score
[2] Singapore	606 (3.2)	629 (3.5)	23 (1.4) ▲	602 (3.4)	−4 (1.1) ▼	588 (3.7)	−18 (1.2) ▼
Korea, Rep. of	605 (1.9)	614 (2.0)	9 (1.6) ▲	600 (2.2)	−5 (2.1) ▼	603 (2.3)	−2 (1.5)
[2] Hong Kong SAR	602 (3.4)	619 (3.2)	17 (1.2) ▲	597 (3.2)	−4 (0.8) ▼	589 (3.4)	−13 (1.4) ▼
Chinese Taipei	591 (2.0)	599 (2.1)	8 (1.6) ▲	593 (2.0)	2 (1.0) ▲	577 (2.5)	−14 (2.0) ▼
Japan	585 (1.7)	590 (1.7)	5 (1.0) ▲	579 (1.6)	−6 (1.1) ▼	592 (2.0)	6 (1.0) ▲
† Northern Ireland	562 (2.9)	580 (3.4)	17 (1.7) ▲	565 (2.9)	2 (2.0)	538 (3.3)	−25 (2.1) ▼
Belgium (Flemish)	549 (1.9)	564 (1.9)	15 (0.9) ▲	546 (2.2)	−3 (1.1) ▼	532 (2.7)	−17 (1.6) ▼
Finland	545 (2.3)	548 (2.6)	2 (1.3)	544 (2.7)	−2 (1.8)	546 (2.2)	0 (1.1)
England	542 (3.5)	552 (4.3)	10 (2.7) ▲	542 (3.7)	0 (1.5)	531 (3.7)	−11 (2.2) ▼
Russian Federation	542 (3.7)	541 (3.4)	−1 (1.7)	539 (3.9)	−3 (1.1) ▼	548 (3.6)	6 (1.5) ▲
[2] United States	541 (1.8)	556 (2.1)	15 (0.9) ▲	539 (2.1)	−2 (0.7) ▼	525 (2.2)	−15 (0.9) ▼
† Netherlands	540 (1.7)	537 (2.0)	−3 (1.4)	540 (1.6)	0 (0.9)	543 (2.6)	3 (1.6) ▲
[2] Denmark	537 (2.6)	531 (2.6)	−6 (1.4) ▼	539 (2.9)	2 (1.7)	543 (2.7)	6 (1.4) ▲
[1 2] Lithuania	534 (2.4)	525 (3.0)	−9 (1.4) ▼	540 (2.5)	7 (0.8) ▲	536 (2.5)	3 (1.4)
Portugal	532 (3.4)	531 (3.5)	−2 (1.4)	534 (3.9)	2 (1.3)	531 (4.1)	−2 (2.0)
Germany	528 (2.2)	524 (2.3)	−4 (1.0) ▼	528 (2.3)	0 (1.1)	532 (3.0)	4 (2.1) ▲
Ireland	527 (2.6)	539 (3.1)	12 (1.5) ▲	529 (2.7)	1 (1.4)	510 (3.1)	−18 (2.2) ▼
[2] Serbia	516 (3.0)	520 (2.9)	4 (1.3) ▲	511 (3.1)	−5 (1.3) ▼	514 (3.7)	−2 (2.3)
Australia	516 (2.9)	516 (3.5)	1 (1.7)	519 (3.0)	3 (1.5) ▲	513 (2.6)	−3 (1.8)
Hungary	515 (3.4)	519 (3.8)	4 (0.9) ▲	513 (3.3)	−2 (1.2)	514 (3.7)	−1 (1.4)
Slovenia	513 (2.2)	510 (2.8)	−3 (1.7)	514 (2.3)	1 (1.5)	516 (2.9)	3 (2.0)
Czech Republic	511 (2.4)	502 (2.4)	−9 (1.3) ▼	512 (2.8)	1 (1.3)	523 (2.7)	12 (1.3) ▲
Austria	508 (2.6)	507 (2.5)	−1 (0.8)	506 (2.6)	−3 (1.3) ▼	513 (3.3)	5 (2.1) ▲
Italy	508 (2.6)	510 (2.7)	2 (1.8)	506 (2.8)	−2 (1.4)	505 (3.4)	−2 (1.7)
Slovak Republic	507 (3.8)	506 (3.8)	−1 (1.3)	505 (4.0)	−2 (1.7)	511 (3.9)	4 (1.0) ▲
Sweden	504 (2.0)	489 (2.2)	−15 (1.1) ▼	507 (2.2)	4 (1.3) ▲	520 (3.0)	16 (1.8) ▲
[2] Kazakhstan	501 (4.5)	503 (4.7)	2 (1.7)	499 (5.0)	−2 (2.0)	501 (4.7)	0 (1.5)
Malta	496 (1.3)	504 (1.5)	8 (1.3) ▲	497 (2.0)	1 (1.9)	475 (1.7)	−20 (1.7) ▼
‡ Norway	495 (2.8)	487 (3.1)	−8 (2.0) ▼	499 (3.0)	4 (1.6) ▲	501 (3.3)	6 (2.4) ▲
[2] Croatia	490 (1.9)	495 (1.9)	4 (1.4) ▲	484 (2.0)	−6 (1.2) ▼	492 (2.9)	2 (2.3)
New Zealand	486 (2.6)	476 (3.2)	−10 (1.2) ▼	490 (2.4)	4 (1.1) ▲	490 (2.5)	4 (1.5) ▲
Spain	482 (2.9)	482 (3.3)	0 (1.7)	483 (3.1)	1 (1.6)	483 (2.9)	0 (1.7)
Romania	482 (5.8)	484 (6.3)	2 (2.1)	478 (6.0)	−4 (1.7) ▼	486 (5.9)	4 (2.5)
Poland	481 (2.2)	475 (2.6)	−6 (1.7) ▼	480 (2.6)	−2 (1.4)	493 (2.4)	12 (1.4) ▲
Turkey	469 (4.7)	475 (5.4)	6 (1.9) ▲	469 (4.8)	−1 (1.3)	462 (4.5)	−8 (1.8) ▼
[2] Azerbaijan	463 (5.8)	473 (6.4)	10 (1.8) ▲	457 (6.0)	−6 (1.2) ▼	445 (5.9)	−18 (1.7) ▼
Chile	462 (2.3)	455 (2.5)	−6 (1.4) ▼	463 (2.5)	1 (1.3)	469 (2.5)	7 (1.5) ▲
Thailand	458 (4.8)	453 (5.1)	−5 (1.3) ▼	458 (4.8)	0 (1.3)	464 (4.7)	6 (1.8) ▲
Armenia	452 (3.5)	461 (4.0)	9 (1.9) ▲	446 (4.0)	−6 (1.5) ▼	442 (3.8)	−10 (2.0) ▼
[1] Georgia	450 (3.7)	449 (3.7)	−1 (2.0)	447 (3.4)	−3 (1.4)	450 (3.5)	0 (1.7)
Bahrain	436 (3.3)	438 (3.8)	2 (2.7)	431 (3.4)	−5 (1.7) ▼	439 (3.4)	3 (1.5) ▲
United Arab Emirates	434 (2.0)	437 (2.2)	3 (1.2) ▲	430 (2.1)	−4 (1.0) ▼	434 (2.4)	−1 (1.3)
Iran, Islamic Rep. of	431 (3.5)	435 (3.8)	4 (1.4) ▲	427 (3.6)	−3 (1.1) ▼	423 (3.0)	−8 (1.1) ▼
[2] Qatar	413 (3.5)	411 (3.8)	−2 (1.8)	411 (3.4)	−2 (1.7)	416 (4.4)	3 (3.5)
Saudi Arabia	410 (5.3)	409 (6.1)	−1 (2.5)	405 (5.9)	−5 (2.1) ▼	412 (6.0)	2 (2.8)
Ψ Oman	385 (2.9)	380 (3.2)	−5 (1.5) ▼	382 (2.9)	−3 (1.3) ▼	391 (2.6)	6 (1.4) ▲
Ψ Tunisia	359 (3.9)	370 (4.0)	11 (1.9) ▲	346 (4.4)	−13 (1.6) ▼	335 (4.7)	−25 (2.3) ▼
[1] ж Kuwait	342 (3.4)	343 (3.5)	1 (1.9)	330 (4.5)	−12 (3.5) ▼	329 (3.6)	−12 (3.2) ▼
ж Morocco	335 (4.0)	320 (4.2)	−14 (1.8) ▼	332 (3.9)	−2 (1.7)	347 (4.2)	12 (2.5) ▲
ж Yemen	248 (6.0)	217 (6.8)	−31 (2.4) ▼	237 (6.3)	−11 (2.0) ▼	244 (5.5)	−4 (3.6)

▲ Subscale score significantly higher than overall mathematics score

▼ Subscale score significantly lower than overall mathematics score

ж Average achievement not reliably measured because the percentage of students with achievement too low for estimation exceeds 25%.

Ψ Reservations about reliability of average achievement because the percentage of students with achievement too low for estimation does not exceed 25% but exceeds 15%.

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

TIMSS & PIRLS International Study Center Lynch School of Education, Boston College

Exhibit 3.3: Achievement in Mathematics Cognitive Domains (Continued)

Country	Overall Mathematics Average Scale Score	Knowing		Applying		Reasoning	
		Average Scale Score	Difference from Overall Mathematics Score	Average Scale Score	Difference from Overall Mathematics Score	Average Scale Score	Difference from Overall Mathematics Score
Sixth Grade Participants							
Botswana	419 (3.7)	424 (4.5)	5 (2.4) ▲	421 (3.9)	1 (1.0)	402 (3.7)	−18 (2.0) ▼
Ψ Honduras	396 (5.5)	385 (5.5)	−12 (1.8) ▼	398 (5.7)	1 (2.1)	403 (5.8)	6 (1.8) ▲
Ж Yemen	348 (5.7)	338 (6.0)	−11 (2.2) ▼	345 (5.8)	−3 (1.6) ▼	355 (6.0)	7 (3.2) ▲
Benchmarking Participants							
1 2 North Carolina, US	554 (4.2)	574 (4.3)	20 (2.2) ▲	553 (4.7)	−1 (2.3)	533 (4.5)	−21 (2.4) ▼
1 3 Florida, US	545 (2.9)	568 (3.9)	23 (2.2) ▲	542 (3.6)	−4 (2.1)	523 (3.9)	−22 (2.4) ▼
Quebec, Canada	533 (2.4)	536 (2.6)	3 (1.2) ▲	529 (2.6)	−4 (1.1) ▼	534 (2.5)	1 (1.4)
Ontario, Canada	518 (3.1)	510 (3.5)	−8 (1.5) ▼	521 (3.5)	3 (1.0) ▲	522 (3.1)	4 (1.2) ▲
2 Alberta, Canada	507 (2.5)	498 (2.9)	−8 (1.7) ▼	508 (2.6)	1 (1.6)	514 (3.0)	7 (2.2) ▲
Dubai, UAE	468 (1.6)	472 (2.4)	4 (1.5) ▲	465 (2.3)	−3 (1.9)	464 (2.2)	−4 (1.9) ▼
Abu Dhabi, UAE	417 (4.6)	418 (5.0)	1 (2.2)	413 (4.7)	−4 (1.4) ▼	418 (4.5)	1 (2.0)

▲ Subscale score significantly higher than overall mathematics score

▼ Subscale score significantly lower than overall mathematics score

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 3.4: Achievement in Mathematics Cognitive Domains

TIMSS 2011 8th Grade Mathematics

Country	Overall Mathematics Average Scale Score	Knowing		Applying		Reasoning	
		Average Scale Score	Difference from Overall Mathematics Score	Average Scale Score	Difference from Overall Mathematics Score	Average Scale Score	Difference from Overall Mathematics Score
Korea, Rep. of	613 (2.9)	616 (2.9)	3 (1.9)	617 (2.9)	4 (1.1) ▲	612 (2.5)	0 (1.0)
2 Singapore	611 (3.8)	617 (3.8)	6 (1.0) ▲	613 (3.9)	2 (0.7) ▲	604 (4.3)	−7 (1.0) ▼
Chinese Taipei	609 (3.2)	611 (3.7)	2 (1.4)	614 (3.5)	5 (1.7) ▲	609 (3.4)	0 (1.5)
Hong Kong SAR	586 (3.8)	591 (3.9)	6 (1.2) ▲	587 (3.7)	2 (1.0)	580 (3.9)	−6 (1.1) ▼
Japan	570 (2.6)	558 (2.7)	−12 (1.5) ▼	574 (2.5)	4 (1.3) ▲	579 (3.0)	9 (1.8) ▲
2 Russian Federation	539 (3.6)	548 (3.6)	9 (1.0) ▲	538 (3.5)	−1 (1.3)	531 (3.7)	−8 (1.2) ▼
3 Israel	516 (4.1)	516 (4.1)	0 (1.1)	513 (4.4)	−3 (1.4) ▼	520 (4.0)	4 (1.7) ▲
Finland	514 (2.5)	508 (2.5)	−6 (1.0) ▼	520 (2.5)	6 (1.4) ▲	512 (2.7)	−2 (1.5)
2 United States	509 (2.6)	519 (2.7)	10 (0.8) ▲	503 (2.8)	−6 (1.0) ▼	503 (2.7)	−6 (0.7) ▼
‡ England	507 (5.5)	501 (5.4)	−5 (1.1) ▼	508 (5.5)	2 (1.2)	510 (5.5)	3 (2.0)
Hungary	505 (3.5)	507 (3.8)	2 (1.6)	505 (3.5)	0 (1.2)	502 (3.7)	−3 (0.8) ▼
Australia	505 (5.1)	504 (5.1)	−1 (1.1)	506 (4.8)	1 (1.0)	506 (4.9)	1 (1.0)
Slovenia	505 (2.2)	508 (2.4)	3 (1.1) ▲	502 (2.1)	−2 (0.7) ▼	500 (2.7)	−5 (1.3) ▼
1 Lithuania	502 (2.5)	502 (2.6)	−1 (1.1)	508 (2.4)	5 (1.0) ▲	493 (2.5)	−10 (1.9) ▼
Italy	498 (2.4)	494 (2.6)	−4 (0.8) ▼	503 (2.2)	4 (1.0) ▲	496 (2.6)	−2 (1.0) ▼
New Zealand	488 (5.5)	481 (5.6)	−7 (1.1) ▼	491 (5.0)	3 (1.3) ▲	494 (5.3)	6 (1.6) ▲
Kazakhstan	487 (4.0)	489 (4.4)	2 (1.3)	484 (4.2)	−3 (1.0) ▼	482 (4.7)	−5 (2.1) ▼
Sweden	484 (1.9)	478 (2.0)	−7 (1.5) ▼	489 (2.2)	5 (1.0) ▲	478 (2.4)	−7 (1.1) ▼
Ukraine	479 (3.9)	481 (4.4)	2 (1.7)	480 (4.3)	1 (1.8)	467 (4.2)	−12 (1.8) ▼
Norway	475 (2.4)	465 (2.5)	−10 (1.2) ▼	480 (2.6)	6 (1.3) ▲	478 (2.9)	3 (1.9)
Armenia	467 (2.7)	476 (2.9)	9 (1.3) ▲	458 (3.0)	−8 (1.5) ▼	451 (3.0)	−15 (1.6) ▼
Romania	458 (4.0)	460 (4.4)	2 (1.4)	454 (3.9)	−4 (1.5) ▼	455 (4.0)	−3 (1.6)
United Arab Emirates	456 (2.1)	467 (2.2)	11 (0.7) ▲	442 (2.2)	−14 (0.8) ▼	449 (2.1)	−7 (0.7) ▼
Turkey	452 (3.9)	441 (4.1)	−12 (1.3) ▼	459 (4.0)	6 (1.2) ▲	465 (3.5)	12 (1.1) ▲
Lebanon	449 (3.7)	464 (3.9)	15 (1.8) ▲	436 (4.1)	−13 (1.4) ▼	426 (4.7)	−24 (1.9) ▼
Malaysia	440 (5.4)	444 (5.7)	4 (0.9) ▲	439 (5.2)	−1 (0.9)	426 (5.5)	−14 (2.0) ▼
1 Georgia	431 (3.8)	438 (4.2)	6 (1.9) ▲	425 (3.6)	−6 (1.3) ▼	414 (4.2)	−17 (2.2) ▼
Thailand	427 (4.3)	423 (4.7)	−4 (1.5) ▼	428 (4.1)	1 (1.1)	429 (4.3)	2 (1.1)
Ψ Macedonia, Rep. of	426 (5.2)	430 (5.6)	4 (2.5)	417 (5.2)	−9 (1.7) ▼	424 (5.9)	−3 (3.3)
Tunisia	425 (2.8)	425 (2.8)	0 (0.8)	421 (2.9)	−4 (1.3) ▼	423 (2.7)	−2 (1.0) ▼
Chile	416 (2.6)	405 (2.9)	−11 (1.4) ▼	425 (2.5)	9 (0.9) ▲	422 (2.8)	5 (1.5) ▲
Ψ Iran, Islamic Rep. of	415 (4.3)	410 (4.4)	−5 (1.5) ▼	411 (4.6)	−4 (2.2)	428 (4.3)	13 (1.6) ▲
Ψ Qatar	410 (3.1)	418 (2.9)	8 (1.5) ▲	396 (3.3)	−13 (1.7) ▼	406 (3.3)	−3 (1.8)
Ψ Bahrain	409 (2.0)	411 (2.4)	2 (2.0)	400 (2.4)	−9 (1.8) ▼	415 (2.1)	5 (1.9) ▲
Ψ Jordan	406 (3.7)	405 (4.3)	−1 (1.5)	397 (3.8)	−9 (1.4) ▼	416 (3.8)	10 (1.9) ▲
Ψ Palestinian Nat'l Auth.	404 (3.5)	406 (3.5)	2 (1.1) ▲	397 (3.5)	−7 (1.1) ▼	404 (4.1)	0 (1.6)
Ψ Saudi Arabia	394 (4.6)	402 (4.6)	8 (0.9) ▲	375 (4.8)	−19 (1.2) ▼	388 (4.7)	−6 (2.8) ▼
Ψ Indonesia	386 (4.3)	378 (4.8)	−8 (1.1) ▼	384 (4.7)	−2 (1.5)	388 (3.8)	2 (1.7)
Ψ Syrian Arab Republic	380 (4.5)	374 (4.4)	−6 (2.4) ▼	379 (4.2)	−1 (2.4)	371 (5.4)	−9 (2.8) ▼
⁂ Morocco	371 (2.0)	363 (2.2)	−8 (1.2) ▼	378 (1.9)	7 (1.4) ▲	357 (2.7)	−14 (1.7) ▼
Ψ Oman	366 (2.8)	365 (3.0)	−2 (1.4)	360 (3.0)	−6 (1.6) ▼	369 (2.8)	3 (1.6)
⁂ Ghana	331 (4.3)	331 (4.4)	1 (2.1)	316 (4.1)	−15 (1.3) ▼	324 (4.8)	−7 (1.9) ▼

▲ Subscale score significantly higher than overall mathematics score

▼ Subscale score significantly lower than overall mathematics score

⁂ Average achievement not reliably measured because the percentage of students with achievement too low for estimation exceeds 25%.

Ψ Reservations about reliability of average achievement because the percentage of students with achievement too low for estimation does not exceed 25% but exceeds 15%.

See Appendix C.3 for target population coverage notes 1, 2, and 3. See Appendix C.9 for sampling guidelines and sampling participation notes †, ‡, and ‡.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 3.4: Achievement in Mathematics Cognitive Domains (Continued)

Country	Overall Mathematics Average Scale Score	Knowing		Applying		Reasoning	
		Average Scale Score	Difference from Overall Mathematics Score	Average Scale Score	Difference from Overall Mathematics Score	Average Scale Score	Difference from Overall Mathematics Score
Ninth Grade Participants							
Ψ Botswana	397 (2.5)	404 (2.6)	7 (1.2) ▲	383 (2.8)	−13 (1.3) ▼	398 (2.4)	1 (1.2)
✳ South Africa	352 (2.5)	352 (2.3)	0 (0.7)	336 (2.7)	−16 (0.9) ▼	363 (2.5)	11 (1.4) ▲
2 ✳ Honduras	338 (3.7)	335 (4.5)	−3 (2.9)	340 (3.6)	2 (2.1)	322 (4.3)	−16 (2.1) ▼
Benchmarking Participants							
1 2 Massachusetts, US	561 (5.3)	569 (5.9)	8 (2.1) ▲	555 (5.6)	−6 (1.4) ▼	562 (5.9)	1 (1.7)
1 Minnesota, US	545 (4.6)	556 (4.9)	11 (2.0) ▲	540 (5.5)	−5 (1.7) ▼	536 (5.4)	−9 (1.8) ▼
1 2 North Carolina, US	537 (6.8)	548 (7.4)	11 (1.5) ▲	531 (7.5)	−6 (2.0) ▼	531 (6.8)	−6 (2.2) ▼
Quebec, Canada	532 (2.3)	528 (2.9)	−3 (1.5) ▼	536 (2.7)	4 (1.3) ▲	529 (2.7)	−3 (1.2) ▼
1 2 Indiana, US	522 (5.1)	534 (5.2)	12 (1.0) ▲	516 (5.6)	−6 (0.9) ▼	511 (5.5)	−11 (1.4) ▼
1 Colorado, US	518 (4.9)	519 (4.9)	2 (2.2)	515 (5.1)	−3 (1.7)	517 (5.2)	−1 (2.7)
1 2 Connecticut, US	518 (4.8)	528 (5.3)	10 (2.2) ▲	511 (4.9)	−7 (1.2) ▼	511 (5.1)	−7 (1.7) ▼
1 2 Florida, US	513 (6.4)	524 (7.1)	10 (1.6) ▲	504 (7.3)	−9 (2.0) ▼	505 (7.0)	−8 (1.6) ▼
2 Ontario, Canada	512 (2.5)	503 (2.6)	−9 (1.0) ▼	510 (2.4)	−2 (1.1)	524 (2.8)	13 (1.3) ▲
2 Alberta, Canada	505 (2.6)	500 (2.5)	−5 (1.2) ▼	505 (2.8)	0 (1.6)	512 (3.0)	7 (1.1) ▲
1 2 California, US	493 (4.9)	507 (5.2)	15 (1.0) ▲	480 (5.6)	−12 (1.5) ▼	483 (5.0)	−9 (1.5) ▼
Dubai, UAE	478 (2.1)	488 (2.3)	11 (1.5) ▲	465 (2.4)	−12 (1.4) ▼	470 (2.7)	−8 (1.8) ▼
1 Alabama, US	466 (5.9)	476 (6.2)	10 (1.5) ▲	458 (6.6)	−8 (1.4) ▼	454 (7.2)	−12 (3.6) ▼
Abu Dhabi, UAE	449 (3.7)	459 (3.8)	11 (0.8) ▲	434 (4.3)	−14 (1.7) ▼	442 (4.1)	−7 (1.3) ▼

▲ Subscale score significantly higher than overall mathematics score

▼ Subscale score significantly lower than overall mathematics score

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

The presentation of results for the cognitive domains in Exhibits 3.3 and 3.4 follows the layout of results in the content domains (Exhibits 3.1 and 3.2). Similar to the results for the content domains, generally, the TIMSS 2011 participants with the highest mathematics achievement overall also had highest achievement in the cognitive domains, although most countries showed a relative strength in one cognitive domain or another. At the fourth grade, the highest achieving countries and benchmarking participants performed relatively better in the knowing domain than overall and, with some exceptions, relatively less well in applying and reasoning. In general, more participants in the fourth grade assessment had relatively higher achievement in knowing (than lower achievement in this domain) compared to mathematics overall, and nearly half performed less well in applying compared to only few performing better in applying than overall. Participants were equally divided between performing relatively better and relatively less well in the reasoning domain.

At the eighth grade, the highest achieving countries showed a variety of relative strengths in the cognitive domains, with Korea and Chinese Taipei performing relatively better in applying, Singapore performing relatively better in knowing and applying and less well in reasoning, Hong Kong SAR doing better in knowing and less well in reasoning, and Japan doing less well in knowing and relatively better in applying and reasoning. Across the countries participating at the eighth and ninth grades, approximately the same number performed relatively higher in knowing than in mathematics overall as performed relatively lower. However, compared to mathematics overall, fewer performed relatively higher in applying and reasoning than performed lower.

Trends in Achievement in Mathematics Content Domains

Exhibits 3.5 and 3.6 show changes from 2007 to 2011 in average achievement in the mathematics content domains for fourth and eighth grade students, respectively. Countries are shown in alphabetical order, followed by the benchmarking participants.

Many of the TIMSS 2011 fourth grade participants that also participated in 2007 and have comparable data showed an increase in mathematics achievement over this four-year period. Referring back to Exhibit 1.5, it can be seen that 10 countries (Chinese Taipei, the Czech Republic, Denmark, Georgia, Iran, Japan, Norway, Slovenia, Tunisia, and the United States) and 2 benchmarking participants (Québec and Dubai) had higher average mathematics achievement in 2011 than in 2007, and no participant had lower

achievement. Exhibit 3.5 shows that in six of the countries with an increase—Chinese Taipei, the Czech Republic, Iran, Norway, Slovenia, and Tunisia—and in both benchmarking participants, the overall increase was due to increased achievement in all three mathematics content domains. However, there were also countries where the overall mathematics increase was due primarily to increases in particular domains. In Denmark, the 2007–2011 increase was due to improved performance in number, whereas in Georgia it was due to improved performance in geometric shapes and measures and data display. The increases in overall mathematics achievement in Japan and the United States resulted from improvements in number and geometric shapes and measures.

Although not showing overall increases in mathematics achievement between 2007 and 2011, Austria and the Netherlands had improved performance in data display; Germany and Hungary in geometric shapes and measures and data display; Lithuania in geometric shapes and measures; and the Slovak Republic in number and data display. Australia had a decrease in data display, and New Zealand decreases in geometric shapes and measures and data display. Alberta province had increased achievement in number, but lower achievement in geometric shapes and measures and data display.

Of the TIMSS 2011 eighth grade participants that also participated in 2007 and have comparable data, there were both participants with increases and participants with decreases in average mathematics achievement over the period. From Exhibit 1.6 it can be seen that nine countries (Bahrain, Chinese Taipei, Georgia, Italy, Korea, Palestine, the Russian Federation, Singapore, and the Ukraine) and Dubai, UAE had higher average mathematics achievement in 2011 than in 2007, and six countries (Hungary, Jordan, Malaysia, Sweden, Syria, and Thailand) had lower achievement. Exhibit 3.6 shows that in four of the countries with an overall increase—Italy, Palestine, the Russian Federation, and the Ukraine—the increase was due to improved performance in all four mathematics content domains. In Chinese Taipei, the increase was due to improvements in number and geometry; in Bahrain, Georgia, and Dubai due to improved number, algebra, and data and chance; in Korea due to improved number, geometry, and data and chance; and in Singapore due to improved algebra, geometry, and data and chance. Among the countries with an overall decrease in mathematics achievement, only Jordan and Malaysia had decreases in all four content domains. Syria had declines in number, geometry, and data and chance. Of the others, the decline in Hungary was due mainly to a drop in algebra performance; in Sweden

Exhibit 3.5: Trends in Achievement for Mathematics Content Domains

TIMSS 2011 Mathematics 4th Grade

Country	Number			Geometric Shapes and Measures		
	2011 Average Scale Score	2007 Average Scale Score	Difference	2011 Average Scale Score	2007 Average Scale Score	Difference
Australia	508 (3.2)	503 (3.5)	5 (4.8)	534 (3.0)	536 (3.7)	–3 (4.8)
Austria	506 (2.5)	506 (2.2)	0 (3.3)	512 (3.4)	506 (2.8)	6 (4.4)
Chinese Taipei	599 (2.0)	583 (1.8)	17 (2.7) ▲	573 (2.1)	566 (2.7)	7 (3.4) ▲
Czech Republic	509 (2.5)	486 (2.9)	23 (3.8) ▲	513 (3.0)	487 (3.3)	26 (4.5) ▲
Denmark	534 (2.4)	513 (2.9)	21 (3.8) ▲	548 (3.0)	546 (3.2)	2 (4.4)
England	539 (3.7)	535 (3.1)	4 (4.8)	545 (3.9)	552 (3.3)	–6 (5.1)
Georgia	473 (3.1)	470 (3.7)	2 (4.8)	411 (4.3)	395 (5.9)	16 (7.3) ▲
Germany	520 (2.3)	524 (2.2)	–4 (3.2)	536 (2.6)	527 (2.4)	9 (3.6) ▲
Hong Kong SAR	604 (3.3)	608 (3.7)	–4 (5.0)	605 (3.4)	613 (3.7)	–9 (5.1)
Hungary	515 (3.2)	515 (3.5)	0 (4.8)	520 (3.6)	507 (3.9)	14 (5.3) ▲
Iran, Islamic Rep. of	440 (3.3)	407 (3.5)	32 (4.8) ▲	435 (3.9)	408 (3.9)	26 (5.6) ▲
Italy	510 (2.7)	510 (3.0)	0 (4.0)	513 (3.1)	507 (3.6)	6 (4.8)
Japan	584 (1.6)	564 (2.1)	20 (2.7) ▲	589 (2.0)	575 (2.6)	14 (3.3) ▲
Lithuania	537 (2.4)	536 (2.2)	1 (3.3)	531 (3.0)	518 (3.0)	12 (4.2) ▲
Netherlands	543 (1.7)	539 (2.2)	4 (2.7)	524 (2.9)	522 (2.7)	2 (4.0)
New Zealand	483 (2.5)	485 (2.6)	–3 (3.6)	483 (2.5)	495 (2.6)	–12 (3.6) ▼
Norway	488 (3.1)	468 (2.8)	20 (4.2) ▲	507 (3.0)	479 (3.6)	27 (4.7) ▲
Russian Federation	545 (3.3)	549 (4.4)	–4 (5.4)	542 (4.3)	543 (6.2)	–1 (7.5)
Singapore	619 (3.4)	611 (4.1)	8 (5.4)	589 (3.6)	584 (4.4)	5 (5.7)
Slovak Republic	511 (3.7)	500 (3.9)	11 (5.4) ▲	500 (4.3)	494 (5.3)	6 (6.8)
Slovenia	503 (2.7)	490 (1.9)	13 (3.2) ▲	526 (2.3)	520 (2.0)	6 (3.0) ▲
Sweden	500 (2.2)	495 (2.5)	5 (3.3)	500 (2.4)	503 (2.9)	–4 (3.8)
Ψ Tunisia	390 (3.7)	359 (4.5)	31 (5.8) ▲	329 (4.6)	296 (5.4)	33 (7.1) ▲
United States	543 (2.0)	529 (2.6)	13 (3.3) ▲	535 (2.2)	522 (3.0)	13 (3.7) ▲
Benchmarking Participants						
Alberta, Canada	505 (2.7)	496 (3.1)	10 (4.2) ▲	496 (2.6)	508 (3.5)	–12 (4.4) ▼
Ontario, Canada	504 (3.4)	495 (3.5)	9 (4.9)	535 (3.4)	530 (3.6)	5 (5.0)
Quebec, Canada	531 (2.6)	515 (3.0)	16 (4.0) ▲	536 (3.2)	524 (3.9)	12 (5.0) ▲
Dubai, UAE	474 (1.7)	452 (2.0)	21 (2.6) ▲	449 (2.3)	424 (3.3)	26 (4.1) ▲

▲ 2011 average significantly higher

▼ 2011 average significantly lower

Ψ Reservations about reliability of average achievement in TIMSS 2011, because the percentage of students with achievement too low for estimation does not exceed 25% but exceeds 15%.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

TIMSS & PIRLS International Study Center
Lynch School of Education, Boston College

Exhibit 3.5: Trends in Achievement for Mathematics Content Domains (Continued)

Country	Data Display			
	2011 Average Scale Score	2007 Average Scale Score	Difference	
Australia	515 (3.1)	532 (4.1)	−17 (5.2)	▼
Austria	515 (3.1)	502 (3.4)	13 (4.6)	▲
Chinese Taipei	600 (2.6)	576 (2.3)	24 (3.4)	▲
Czech Republic	519 (3.1)	482 (4.2)	37 (5.2)	▲
Denmark	532 (3.0)	527 (4.2)	5 (5.2)	
England	549 (4.6)	551 (3.1)	−1 (5.6)	
Georgia	433 (4.0)	390 (5.4)	43 (6.7)	▲
Germany	546 (2.8)	532 (3.7)	14 (4.6)	▲
Hong Kong SAR	593 (3.6)	600 (3.4)	−7 (5.0)	
Hungary	510 (4.2)	497 (4.2)	13 (6.0)	▲
Iran, Islamic Rep. of	397 (4.3)	374 (5.0)	24 (6.6)	▲
Italy	495 (3.1)	499 (4.1)	−4 (5.1)	
Japan	590 (2.9)	588 (3.5)	2 (4.6)	
Lithuania	526 (3.0)	529 (3.6)	−3 (4.7)	
Netherlands	559 (2.9)	545 (2.8)	14 (4.0)	▲
New Zealand	491 (2.7)	506 (3.0)	−15 (4.1)	▼
Norway	494 (3.2)	474 (2.9)	20 (4.4)	▲
Russian Federation	533 (4.1)	529 (6.2)	4 (7.4)	
Singapore	588 (3.4)	597 (3.9)	−9 (5.2)	
Slovak Republic	504 (4.6)	482 (5.4)	22 (7.1)	▲
Slovenia	532 (2.6)	512 (2.6)	21 (3.7)	▲
Sweden	523 (3.0)	527 (3.2)	−4 (4.3)	
Ψ Tunisia	300 (5.5)	267 (5.5)	33 (7.8)	▲
United States	545 (1.8)	546 (2.9)	−1 (3.4)	
Benchmarking Participants				
Alberta, Canada	524 (3.1)	537 (4.5)	−13 (5.4)	▼
Ontario, Canada	536 (3.5)	545 (4.0)	−9 (5.3)	
Quebec, Canada	538 (3.7)	523 (4.4)	15 (5.7)	▲
Dubai, UAE	471 (3.1)	444 (3.1)	27 (4.3)	▲

▲ 2011 average significantly higher

▼ 2011 average significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 3.6: Trends in Achievement for Mathematics Content Domains

TIMSS 2011 Mathematics 8th Grade

Country	Number			Algebra		
	2011 Average Scale Score	2007 Average Scale Score	Difference	2011 Average Scale Score	2007 Average Scale Score	Difference
Australia	513 (5.4)	504 (4.0)	9 (6.7)	489 (5.3)	474 (4.2)	15 (6.7) ▲
Ψ Bahrain	397 (1.7)	381 (2.5)	15 (3.0) ▲	424 (1.7)	397 (1.7)	28 (2.4) ▲
Chinese Taipei	598 (3.1)	586 (4.3)	12 (5.3) ▲	628 (3.8)	629 (6.0)	−1 (7.1)
England	512 (5.8)	511 (5.4)	1 (7.9)	489 (5.7)	496 (5.1)	−7 (7.6)
Georgia	435 (3.5)	416 (6.2)	19 (7.1) ▲	450 (3.8)	416 (7.3)	34 (8.2) ▲
Hong Kong SAR	588 (3.7)	575 (5.9)	13 (7.0)	583 (3.9)	575 (6.0)	8 (7.1)
Hungary	510 (3.9)	520 (3.9)	−11 (5.5)	496 (4.0)	508 (3.8)	−11 (5.5) ▼
Ψ Indonesia	375 (4.8)	393 (4.1)	−18 (6.3) ▼	392 (3.8)	399 (3.9)	−7 (5.5)
Ψ Iran, Islamic Rep. of	402 (4.9)	388 (4.3)	14 (6.6) ▲	422 (4.3)	405 (4.2)	18 (6.0) ▲
Italy	496 (2.9)	480 (3.1)	16 (4.2) ▲	491 (2.7)	460 (3.6)	30 (4.5) ▲
Japan	557 (3.0)	558 (2.4)	−2 (3.8)	570 (3.0)	567 (2.9)	3 (4.2)
Ψ Jordan	390 (3.8)	412 (4.9)	−22 (6.2) ▼	432 (3.9)	445 (4.4)	−14 (5.9) ▼
Korea, Rep. of	618 (2.6)	592 (2.4)	25 (3.6) ▲	617 (3.2)	608 (3.3)	9 (4.6)
Lebanon	451 (3.8)	453 (3.7)	−1 (5.3)	471 (3.8)	468 (3.5)	3 (5.1)
Lithuania	501 (2.5)	507 (2.8)	−6 (3.8)	492 (2.8)	487 (2.9)	5 (4.0)
Malaysia	451 (5.8)	494 (5.5)	−43 (8.0) ▼	430 (5.2)	455 (4.9)	−26 (7.2) ▼
Norway	492 (2.8)	485 (2.1)	8 (3.5) ▲	432 (2.7)	424 (2.8)	8 (3.9) ▲
Ψ Oman	351 (3.0)	354 (3.0)	−4 (4.3)	383 (2.8)	384 (3.4)	0 (4.4)
Ψ Palestinian Nat'l Auth.	400 (3.4)	355 (3.8)	44 (5.1) ▲	419 (3.3)	370 (4.0)	48 (5.2) ▲
Romania	448 (4.1)	455 (3.8)	−7 (5.6)	477 (4.3)	480 (5.0)	−3 (6.6)
Russian Federation	534 (3.2)	510 (4.2)	25 (5.3) ▲	556 (3.7)	525 (4.8)	31 (6.1) ▲
Singapore	611 (3.6)	605 (3.7)	6 (5.2)	614 (4.1)	591 (3.9)	23 (5.7) ▲
Slovenia	511 (2.5)	504 (2.5)	7 (3.6)	493 (2.6)	491 (2.6)	2 (3.7)
Sweden	504 (1.8)	505 (1.9)	−2 (2.6)	459 (2.2)	459 (2.7)	0 (3.5)
Ψ Syrian Arab Republic	373 (4.0)	385 (4.1)	−12 (5.7) ▼	391 (4.9)	398 (4.1)	−6 (6.4)
Thailand	425 (4.6)	443 (5.2)	−18 (7.0) ▼	425 (4.3)	431 (5.5)	−5 (7.0)
Tunisia	431 (2.8)	420 (2.8)	11 (3.9) ▲	419 (2.9)	419 (3.0)	0 (4.2)
Ukraine	472 (4.1)	458 (4.1)	14 (5.8) ▲	487 (4.4)	465 (4.2)	23 (6.1) ▲
United States	514 (3.0)	514 (3.0)	0 (4.2)	512 (2.6)	507 (3.0)	5 (4.0)
Benchmarking Participants						
Ontario, Canada	519 (2.6)	528 (4.2)	−9 (4.9)	497 (2.4)	496 (3.9)	1 (4.6)
Quebec, Canada	543 (2.5)	537 (3.6)	5 (4.4)	516 (2.9)	512 (3.6)	4 (4.6)
Dubai, UAE	479 (2.3)	458 (3.2)	21 (3.9) ▲	489 (2.4)	476 (2.6)	13 (3.6) ▲
Massachusetts, US	567 (5.9)	554 (5.3)	13 (8.0)	559 (5.6)	547 (5.4)	13 (7.8)
Minnesota, US	556 (5.3)	542 (4.4)	14 (6.9) ▲	543 (4.9)	524 (5.0)	19 (7.0) ▲

▲ 2011 average significantly higher

▼ 2011 average significantly lower

Ψ Reservations about reliability of average achievement in TIMSS 2011, because the percentage of students with achievement too low for estimation does not exceed 25% but exceeds 15%.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

TIMSS & PIRLS International Study Center
Lynch School of Education, Boston College

Exhibit 3.6: Trends in Achievement for Mathematics Content Domains (Continued)

Country	Geometry			Data and Chance		
	2011 Average Scale Score	2007 Average Scale Score	Difference	2011 Average Scale Score	2007 Average Scale Score	Difference
Australia	499 (5.4)	488 (3.9)	11 (6.6)	534 (5.9)	526 (4.3)	8 (7.3)
Ψ Bahrain	398 (2.6)	403 (2.8)	–5 (3.9)	407 (2.6)	400 (2.6)	8 (3.7) ▲
Chinese Taipei	625 (3.7)	605 (5.6)	20 (6.7) ▲	584 (3.0)	579 (4.5)	5 (5.4)
England	498 (5.7)	513 (5.0)	–15 (7.6) ▼	543 (6.8)	552 (6.0)	–9 (9.1)
Georgia	406 (4.2)	402 (7.2)	5 (8.4)	392 (4.5)	350 (5.1)	42 (6.8) ▲
Hong Kong SAR	597 (4.3)	580 (6.2)	18 (7.6) ▲	581 (4.1)	560 (6.0)	21 (7.2) ▲
Hungary	501 (4.1)	510 (4.1)	–9 (5.8)	517 (4.3)	527 (4.0)	–10 (5.9)
Ψ Indonesia	377 (5.3)	387 (4.7)	–11 (7.0)	376 (4.8)	382 (4.3)	–6 (6.4)
Ψ Iran, Islamic Rep. of	437 (4.8)	414 (4.8)	23 (6.8) ▲	393 (4.9)	396 (4.0)	–3 (6.4)
Italy	512 (3.5)	491 (3.5)	21 (5.0) ▲	499 (3.2)	485 (3.7)	15 (4.9) ▲
Japan	586 (3.5)	584 (2.6)	2 (4.4)	579 (3.0)	591 (2.7)	–11 (4.0) ▼
Ψ Jordan	407 (3.7)	429 (4.2)	–22 (5.6) ▼	379 (3.7)	406 (4.4)	–27 (5.7) ▼
Korea, Rep. of	612 (2.7)	600 (2.6)	12 (3.8) ▲	616 (2.5)	602 (2.6)	14 (3.6) ▲
Lebanon	447 (3.8)	455 (4.2)	–8 (5.7)	393 (5.2)	388 (5.2)	5 (7.3)
Lithuania	500 (3.1)	509 (3.1)	–9 (4.4) ▼	515 (2.8)	526 (2.8)	–10 (4.0) ▼
Malaysia	432 (6.4)	474 (6.2)	–42 (8.9) ▼	429 (5.3)	459 (5.0)	–30 (7.3) ▼
Norway	461 (3.5)	458 (2.6)	3 (4.4)	513 (3.6)	502 (2.8)	11 (4.6) ▲
Ψ Oman	377 (2.7)	377 (3.2)	0 (4.2)	342 (3.1)	365 (4.0)	–23 (5.1) ▼
Ψ Palestinian Nat'l Auth.	416 (3.6)	378 (4.3)	38 (5.6) ▲	368 (3.6)	344 (3.7)	24 (5.2) ▲
Romania	453 (4.5)	463 (4.4)	–10 (6.3)	429 (4.0)	415 (4.4)	13 (5.9) ▲
Russian Federation	533 (4.0)	510 (4.8)	23 (6.2) ▲	511 (3.9)	483 (4.7)	28 (6.1) ▲
Singapore	609 (3.9)	590 (4.0)	19 (5.6) ▲	607 (4.4)	589 (5.1)	18 (6.7) ▲
Slovenia	504 (3.1)	500 (3.0)	4 (4.3)	518 (3.3)	509 (2.9)	9 (4.4) ▲
Sweden	456 (2.3)	472 (2.7)	–17 (3.6) ▼	504 (2.7)	526 (3.8)	–22 (4.7) ▼
Ψ Syrian Arab Republic	386 (5.0)	409 (4.1)	–22 (6.5) ▼	343 (4.7)	364 (2.9)	–20 (5.5) ▼
Thailand	415 (5.4)	437 (5.9)	–22 (8.0) ▼	431 (4.1)	438 (4.9)	–8 (6.4)
Tunisia	426 (3.2)	431 (2.8)	–5 (4.2)	398 (3.3)	392 (2.9)	7 (4.4)
Ukraine	476 (4.3)	464 (4.0)	11 (5.9) ▲	471 (4.0)	448 (4.2)	22 (5.8) ▲
United States	485 (2.7)	480 (2.8)	5 (3.9)	527 (3.3)	533 (3.5)	–5 (4.8)
Benchmarking Participants						
Ontario, Canada	512 (2.7)	510 (4.7)	1 (5.4)	531 (4.1)	547 (5.0)	–17 (6.5) ▼
Quebec, Canada	529 (2.7)	527 (3.6)	1 (4.5)	549 (2.8)	540 (3.8)	8 (4.7)
Dubai, UAE	453 (3.0)	445 (3.6)	7 (4.7)	468 (2.8)	444 (3.4)	23 (4.4) ▲
Massachusetts, US	548 (5.5)	523 (5.0)	25 (7.5) ▲	584 (7.3)	579 (6.3)	5 (9.6)
Minnesota, US	515 (6.2)	507 (4.8)	8 (7.9)	571 (6.2)	571 (7.0)	0 (9.4)

▲ 2011 average significantly higher

▼ 2011 average significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

due to lower geometry and data and chance achievement; and in Thailand due to a decrease in number and geometry achievement.

Although not showing an overall increase in eighth grade mathematics achievement between 2007 and 2011, a number of participants had improved performance in one or more content domains, including Australia (algebra), Hong Kong SAR (geometry, data and chance), Iran (number, algebra, geometry), Norway (number, algebra, data and chance), Slovenia (data and chance), Tunisia (number), Massachusetts (geometry), and Minnesota (number, algebra). Several participants also had lower achievement in one or more content domains in 2011 without having lower overall mathematics achievement, including England (geometry), Indonesia (number), Japan (data and chance), Lithuania (geometry, data and chance), Oman (data and chance), and Ontario (data and chance).

Trends in Achievement in Mathematics Cognitive Domains

Exhibits 3.7 and 3.8 show changes from 2007 to 2011 in average achievement in the mathematics cognitive domains for fourth and eighth grade students, respectively. As with the content domains, overall increases or decreases in mathematics achievement since 2007 were reflected in increases or decreases in the cognitive domains. As shown in Exhibit 3.7, the overall increase in mathematics achievement was due to increases in all three cognitive domains in the Czech Republic, Denmark, Iran, Japan, Norway, Slovenia, and Tunisia as well as Québec and Dubai. In Chinese Taipei and the United States, the overall increase was due mainly to increases in the knowing and applying domains, whereas in Georgia it was the result of improvement in the applying and reasoning domains. Although not showing an overall increase in fourth grade mathematics achievement between 2007 and 2011, a number of countries had improved performance in one or more cognitive domains, including Germany, the Netherlands, and Ontario province (knowing), Lithuania (reasoning), and the Slovak Republic (knowing, reasoning). New Zealand, while not having lower overall mathematics achievement, performed less well in reasoning in 2011 than in 2007.

Exhibit 3.8 shows that for six of the nine countries with higher average mathematics achievement in 2011 than in 2007 (Georgia, Italy, Palestine, the Russian Federation, Singapore, and the Ukraine) and for Dubai, the increase was due to improved performance in all three mathematics cognitive domains. Whereas for Bahrain, the increase was mainly due to improved performance in knowing and reasoning; for Chinese Taipei, improved performance in applying; and, for Korea, improved performance in applying and reasoning.

Among the six countries with an overall decrease, Jordan and Malaysia had lower achievement in all three cognitive domains. Of the others, Hungary had lower achievement in knowing and reasoning, Sweden in reasoning, and Syria as well as Thailand in applying and reasoning.

Countries without an overall increase in eighth grade mathematics achievement between 2007 and 2011 but with improved performance in one or another cognitive domains included Australia, Hong Kong SAR, Iran, Norway, Slovenia, Tunisia, and the state of Minnesota. Indonesia and Japan had lower achievement in the knowing domain in 2011 than in 2007, and Oman in the reasoning domain.

Achievement in the Mathematics Content and Cognitive Domains by Gender

Exhibits 3.9 and 3.10 present the TIMSS 2011 gender differences in average achievement for the content domains at the fourth and eighth grades. At the fourth grade, boys had higher achievement in number than girls in 22 countries and five benchmarking entities, compared to only four countries where girls outperformed boys. Boys had higher achievement in geometric shapes and measures than girls in nine countries and two benchmarking entities, compared with eight countries and one benchmarking entity where girls outperformed boys. In data display, girls had higher achievement than boys in eleven countries and one benchmarking entity, compared to just four countries where boys had higher achievement. On average across the fourth grade countries, boys had a 3-point advantage in number whereas girls had a 2-point advantage in geometric shapes and measures and a 4-point advantage in data display. At the sixth grade, girls in Botswana performed better than boys in all three content domains, and in Honduras, boys performed better in number than girls.

As shown in Exhibit 3.10, on average across the eighth grade countries, boys had higher achievement than girls in number (468 vs. 464) but girls had higher achievement in algebra (476 vs. 464), geometry (464 vs. 461), and data and chance (459 vs. 456). Boys outperformed girls in number in 18 countries and nine benchmarking entities, while girls outperformed boys in algebra in 22 countries and five benchmarking entities, in geometry in nine countries and one benchmarking entity, and in data and chance in one country.

Exhibits 3.11 and 3.12 present gender differences in the cognitive domains for the fourth and eighth grades. On average across the fourth grade countries, boys had higher achievement than girls in the reasoning domain. However, across the eighth grade countries, girls outperformed boys on average in both the knowing and reasoning domains.

Exhibit 3.7: Trends in Achievement for Mathematics Cognitive Domains

TIMSS 2011 Mathematics 4th Grade

Country	Knowing			Applying		
	2011 Average Scale Score	2007 Average Scale Score	Difference	2011 Average Scale Score	2007 Average Scale Score	Difference
Australia	516 (3.5)	511 (4.4)	5 (5.6)	519 (3.0)	522 (3.8)	–3 (4.8)
Austria	507 (2.5)	504 (2.1)	4 (3.3)	506 (2.6)	505 (2.0)	0 (3.3)
Chinese Taipei	599 (2.1)	586 (1.9)	13 (2.8) ▲	593 (2.0)	574 (1.9)	19 (2.8) ▲
Czech Republic	502 (2.4)	472 (2.5)	30 (3.5) ▲	512 (2.8)	493 (2.9)	19 (4.0) ▲
Denmark	531 (2.6)	514 (2.8)	18 (3.9) ▲	539 (2.9)	527 (2.8)	12 (4.1) ▲
England	552 (4.3)	546 (3.7)	6 (5.6)	542 (3.7)	542 (3.3)	0 (5.0)
Georgia	449 (3.7)	445 (4.2)	4 (5.7)	447 (3.4)	430 (4.7)	17 (5.8) ▲
Germany	524 (2.3)	515 (2.1)	9 (3.1) ▲	528 (2.3)	530 (2.4)	–2 (3.3)
Hong Kong SAR	619 (3.2)	622 (3.7)	–3 (4.9)	597 (3.2)	606 (3.8)	–9 (5.0)
Hungary	519 (3.8)	511 (3.6)	8 (5.2)	513 (3.3)	506 (3.8)	7 (5.0)
Iran, Islamic Rep. of	435 (3.8)	404 (3.8)	31 (5.4) ▲	427 (3.6)	397 (3.9)	30 (5.3) ▲
Italy	510 (2.7)	512 (3.5)	–3 (4.4)	506 (2.8)	499 (3.1)	7 (4.2)
Japan	590 (1.7)	567 (2.4)	24 (2.9) ▲	579 (1.6)	570 (2.2)	9 (2.7) ▲
Lithuania	525 (3.0)	520 (2.8)	5 (4.1)	540 (2.5)	540 (2.7)	0 (3.6)
Netherlands	537 (2.0)	528 (2.4)	9 (3.1) ▲	540 (1.6)	540 (2.2)	0 (2.7)
New Zealand	476 (3.2)	484 (2.7)	–7 (4.2)	490 (2.4)	493 (2.6)	–3 (3.5)
Norway	487 (3.1)	459 (3.0)	28 (4.3) ▲	499 (3.0)	475 (2.9)	24 (4.2) ▲
Russian Federation	541 (3.4)	539 (4.9)	2 (5.9)	539 (3.9)	549 (5.3)	–9 (6.6)
Singapore	629 (3.5)	625 (4.3)	4 (5.5)	602 (3.4)	597 (4.1)	5 (5.4)
Slovak Republic	506 (3.8)	491 (4.3)	15 (5.7) ▲	505 (4.0)	496 (4.4)	9 (5.9)
Slovenia	510 (2.8)	498 (2.0)	12 (3.4) ▲	514 (2.3)	502 (2.0)	12 (3.1) ▲
Sweden	489 (2.2)	483 (2.6)	6 (3.4)	507 (2.2)	506 (2.3)	2 (3.2)
Ψ Tunisia	370 (4.0)	330 (5.3)	40 (6.7) ▲	346 (4.4)	319 (5.2)	27 (6.8) ▲
United States	556 (2.1)	541 (2.8)	14 (3.5) ▲	539 (2.1)	524 (2.8)	15 (3.5) ▲
Benchmarking Participants						
Alberta, Canada	498 (2.9)	494 (3.3)	4 (4.4)	508 (2.6)	503 (3.1)	4 (4.0)
Ontario, Canada	510 (3.5)	498 (3.4)	11 (4.8) ▲	521 (3.5)	513 (3.3)	8 (4.8)
Quebec, Canada	536 (2.6)	519 (3.1)	18 (4.0) ▲	529 (2.6)	516 (2.9)	13 (3.9) ▲
Dubai, UAE	472 (2.4)	454 (2.4)	18 (3.4) ▲	465 (2.3)	436 (1.8)	29 (2.9) ▲

▲ 2011 average significantly higher

▼ 2011 average significantly lower

Ψ Reservations about reliability of average achievement in TIMSS 2011, because the percentage of students with achievement too low for estimation does not exceed 25% but exceeds 15%.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

TIMSS & PIRLS International Study Center
Lynch School of Education, Boston College

Exhibit 3.7: Trends in Achievement for Mathematics Cognitive Domains (Continued)

Country	Reasoning			
	2011 Average Scale Score	2007 Average Scale Score	Difference	
Australia	513 (2.6)	516 (3.7)	–3 (4.6)	
Austria	513 (3.3)	506 (2.3)	7 (4.0)	
Chinese Taipei	577 (2.5)	571 (2.0)	6 (3.2)	
Czech Republic	523 (2.7)	491 (3.7)	31 (4.6)	▲
Denmark	543 (2.7)	525 (2.2)	17 (3.5)	▲
England	531 (3.7)	539 (3.4)	–8 (5.0)	
Georgia	450 (3.5)	433 (4.6)	18 (5.8)	▲
Germany	532 (3.0)	530 (2.9)	2 (4.2)	
Hong Kong SAR	589 (3.4)	596 (3.8)	–7 (5.1)	
Hungary	514 (3.7)	510 (4.2)	5 (5.6)	
Iran, Islamic Rep. of	423 (3.0)	401 (4.3)	22 (5.3)	▲
Italy	505 (3.4)	511 (3.3)	–5 (4.8)	
Japan	592 (2.0)	569 (2.2)	22 (3.0)	▲
Lithuania	536 (2.5)	529 (2.8)	8 (3.7)	▲
Netherlands	543 (2.6)	537 (2.5)	7 (3.6)	
New Zealand	490 (2.5)	502 (2.8)	–12 (3.8)	▼
Norway	501 (3.3)	486 (2.9)	15 (4.4)	▲
Russian Federation	548 (3.6)	544 (5.3)	4 (6.4)	
Singapore	588 (3.7)	584 (4.1)	4 (5.5)	
Slovak Republic	511 (3.9)	499 (4.5)	12 (6.0)	▲
Slovenia	516 (2.9)	504 (2.4)	12 (3.7)	▲
Sweden	520 (3.0)	519 (2.8)	0 (4.1)	
Ψ Tunisia	335 (4.7)	313 (5.4)	21 (7.2)	▲
United States	525 (2.2)	525 (2.4)	1 (3.2)	
Benchmarking Participants				
Alberta, Canada	514 (3.0)	520 (3.2)	–6 (4.4)	
Ontario, Canada	522 (3.1)	526 (2.9)	–5 (4.2)	
Quebec, Canada	534 (2.5)	523 (3.2)	12 (4.0)	▲
Dubai, UAE	464 (2.2)	441 (2.9)	23 (3.7)	▲

▲ 2011 average significantly higher

▼ 2011 average significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 3.8: Trends in Achievement for Mathematics Cognitive Domains

TIMSS 2011 8th Grade Mathematics

Country	Knowing				Applying			
	2011 Average Scale Score	2007 Average Scale Score	Difference		2011 Average Scale Score	2007 Average Scale Score	Difference	
Australia	504 (5.1)	490 (3.8)	14 (6.3)	▲	506 (4.8)	498 (3.6)	8 (6.0)	
Ψ Bahrain	411 (2.4)	389 (1.9)	23 (3.0)	▲	400 (2.4)	400 (2.4)	0 (3.4)	
Chinese Taipei	611 (3.7)	604 (4.9)	7 (6.1)		614 (3.5)	597 (4.6)	17 (5.8)	▲
England	501 (5.4)	508 (4.6)	−6 (7.1)		508 (5.5)	514 (5.1)	−5 (7.4)	
Georgia	438 (4.2)	419 (6.0)	19 (7.3)	▲	425 (3.6)	399 (5.7)	26 (6.8)	▲
Hong Kong SAR	591 (3.9)	583 (6.0)	8 (7.2)		587 (3.7)	572 (6.2)	15 (7.2)	▲
Hungary	507 (3.8)	522 (3.7)	−15 (5.3)	▼	505 (3.5)	513 (3.3)	−9 (4.8)	
Ψ Indonesia	378 (4.8)	391 (4.0)	−13 (6.2)	▼	384 (4.7)	396 (3.7)	−12 (6.0)	
Ψ Iran, Islamic Rep. of	410 (4.4)	397 (4.1)	13 (6.1)	▲	411 (4.6)	399 (4.3)	12 (6.3)	
Italy	494 (2.6)	474 (3.3)	20 (4.2)	▲	503 (2.2)	482 (2.9)	20 (3.6)	▲
Japan	558 (2.7)	569 (2.8)	−11 (3.9)	▼	574 (2.5)	568 (2.4)	6 (3.5)	
Ψ Jordan	405 (4.3)	425 (4.4)	−20 (6.2)	▼	397 (3.8)	421 (4.5)	−24 (5.9)	▼
Korea, Rep. of	616 (2.9)	608 (3.2)	8 (4.3)		617 (2.9)	600 (2.8)	16 (4.0)	▲
Lebanon	464 (3.9)	457 (4.2)	7 (5.7)		436 (4.1)	447 (4.6)	−11 (6.1)	
Lithuania	502 (2.6)	509 (2.7)	−8 (3.8)	▼	508 (2.4)	511 (2.5)	−3 (3.5)	
Malaysia	444 (5.7)	473 (5.4)	−29 (7.9)	▼	439 (5.2)	477 (5.2)	−38 (7.3)	▼
Norway	465 (2.5)	457 (2.0)	8 (3.2)	▲	480 (2.6)	475 (2.4)	5 (3.6)	
Ψ Oman	365 (3.0)	366 (3.7)	−1 (4.8)		360 (3.0)	365 (3.2)	−5 (4.3)	
Ψ Palestinian Nat'l Auth.	406 (3.5)	359 (3.8)	48 (5.1)	▲	397 (3.5)	369 (3.7)	28 (5.0)	▲
Romania	460 (4.4)	464 (4.4)	−4 (6.3)		454 (3.9)	461 (4.1)	−7 (5.6)	
Russian Federation	548 (3.6)	521 (4.4)	28 (5.7)	▲	538 (3.5)	510 (3.9)	28 (5.3)	▲
Singapore	617 (3.8)	592 (3.7)	25 (5.4)	▲	613 (3.9)	597 (3.8)	16 (5.5)	▲
Slovenia	508 (2.4)	501 (2.5)	7 (3.4)	▲	502 (2.1)	502 (2.1)	0 (2.9)	
Sweden	478 (2.0)	480 (2.3)	−2 (3.0)		489 (2.2)	495 (2.1)	−6 (3.0)	
Ψ Syrian Arab Republic	374 (4.4)	386 (4.5)	−12 (6.3)		379 (4.2)	398 (3.7)	−19 (5.6)	▼
Thailand	423 (4.7)	432 (5.2)	−8 (7.0)		428 (4.1)	444 (4.9)	−16 (6.3)	▼
Tunisia	425 (2.8)	414 (2.8)	11 (4.0)	▲	421 (2.9)	422 (2.6)	0 (3.9)	
Ukraine	481 (4.4)	467 (3.8)	14 (5.8)	▲	480 (4.3)	462 (3.6)	18 (5.6)	▲
United States	519 (2.7)	517 (2.9)	2 (4.0)		503 (2.8)	502 (3.0)	1 (4.1)	
Benchmarking Participants								
Ontario, Canada	503 (2.6)	509 (3.6)	−6 (4.4)		510 (2.4)	518 (3.8)	−8 (4.5)	
Quebec, Canada	528 (2.9)	524 (3.0)	4 (4.2)		536 (2.7)	529 (3.2)	6 (4.2)	
Dubai, UAE	488 (2.3)	465 (2.6)	23 (3.5)	▲	465 (2.4)	454 (3.2)	11 (4.0)	▲
Massachusetts, US	569 (5.9)	554 (5.1)	14 (7.8)		555 (5.6)	543 (4.5)	12 (7.2)	
Minnesota, US	556 (4.9)	539 (5.2)	17 (7.2)	▲	540 (5.5)	529 (5.1)	11 (7.5)	

▲ 2011 average significantly higher

▼ 2011 average significantly lower

Ψ Reservations about reliability of average achievement in TIMSS 2011, because the percentage of students with achievement too low for estimation does not exceed 25% but exceeds 15%.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

TIMSS & PIRLS International Study Center
Lynch School of Education, Boston College

Exhibit 3.8: Trends in Achievement for Mathematics Cognitive Domains (Continued)

Country	Reasoning			
	2011 Average Scale Score	2007 Average Scale Score	Difference	
Australia	506 (4.9)	503 (4.0)	3 (6.4)	
Ψ Bahrain	415 (2.1)	406 (2.5)	9 (3.3)	▲
Chinese Taipei	609 (3.4)	602 (4.3)	7 (5.5)	
England	510 (5.5)	518 (4.9)	–8 (7.4)	
Georgia	414 (4.2)	383 (5.9)	30 (7.2)	▲
Hong Kong SAR	580 (3.9)	567 (5.9)	13 (7.1)	
Hungary	502 (3.7)	515 (3.6)	–13 (5.2)	▼
Ψ Indonesia	388 (3.8)	394 (3.5)	–7 (5.2)	
Ψ Iran, Islamic Rep. of	428 (4.3)	417 (3.9)	11 (5.8)	
Italy	496 (2.6)	482 (3.3)	14 (4.2)	▲
Japan	579 (3.0)	577 (2.6)	2 (4.0)	
Ψ Jordan	416 (3.8)	434 (3.9)	–19 (5.5)	▼
Korea, Rep. of	612 (2.5)	592 (2.5)	20 (3.6)	▲
Lebanon	426 (4.7)	423 (4.4)	3 (6.4)	
Lithuania	493 (2.5)	487 (2.8)	6 (3.7)	
Malaysia	426 (5.5)	466 (4.6)	–40 (7.2)	▼
Norway	478 (2.9)	474 (2.6)	4 (3.9)	
Ψ Oman	369 (2.8)	389 (3.3)	–20 (4.3)	▼
Ψ Palestinian Nat'l Auth.	404 (4.1)	371 (3.9)	34 (5.7)	▲
Romania	455 (4.0)	445 (4.9)	11 (6.3)	
Russian Federation	531 (3.7)	499 (4.0)	32 (5.5)	▲
Singapore	604 (4.3)	589 (4.5)	15 (6.2)	▲
Slovenia	500 (2.7)	497 (2.9)	3 (3.9)	
Sweden	478 (2.4)	493 (2.9)	–15 (3.8)	▼
Ψ Syrian Arab Republic	371 (5.4)	387 (3.8)	–16 (6.7)	▼
Thailand	429 (4.3)	452 (5.0)	–23 (6.6)	▼
Tunisia	423 (2.7)	419 (2.8)	4 (3.9)	
Ukraine	467 (4.2)	441 (4.2)	27 (5.9)	▲
United States	503 (2.7)	506 (2.8)	–3 (3.9)	
Benchmarking Participants				
Ontario, Canada	524 (2.8)	526 (3.6)	–1 (4.6)	
Quebec, Canada	529 (2.7)	528 (3.3)	1 (4.2)	
Dubai, UAE	470 (2.7)	460 (3.0)	10 (4.0)	▲
Massachusetts, US	562 (5.9)	548 (4.5)	14 (7.5)	
Minnesota, US	536 (5.4)	528 (4.7)	8 (7.2)	

▲ 2011 average significantly higher

▼ 2011 average significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 3.9: Achievement in Mathematics Content Domains by Gender

TIMSS 2011 Mathematics 4th Grade

Country	Number		Geometric Shapes and Measures		Data Display	
	Girls	Boys	Girls	Boys	Girls	Boys
Armenia	485 (3.3)	483 (3.6)	426 (4.4)	422 (5.0)	392 (6.2)	381 (5.2)
Australia	505 (3.6)	511 (4.1)	532 (3.5)	536 (4.1)	512 (4.0)	519 (3.8)
Austria	502 (2.7)	511 (3.1) ▲	507 (3.5)	516 (4.7) ▲	510 (3.0)	520 (4.1) ▲
2 Azerbaijan	494 (5.8)	488 (5.4)	440 (7.7)	433 (7.8)	414 (6.6) ▲	402 (6.9)
Bahrain	440 (3.8)	438 (3.9)	426 (5.7)	417 (4.5)	448 (5.6)	436 (4.8)
Belgium (Flemish)	547 (2.5)	556 (2.4) ▲	549 (2.4)	555 (2.1) ▲	533 (4.0)	539 (4.0)
Chile	457 (3.4)	466 (3.3) ▲	449 (3.6)	462 (3.5) ▲	463 (3.6)	468 (3.9)
Chinese Taipei	599 (2.7)	600 (2.5)	576 (2.9)	570 (2.6)	605 (2.8) ▲	596 (3.8)
2 Croatia	484 (2.0)	498 (2.7) ▲	487 (2.9)	493 (3.4)	485 (3.3)	491 (3.7)
Czech Republic	502 (3.0)	515 (3.0) ▲	511 (3.4)	515 (3.7)	512 (4.3)	526 (4.2) ▲
2 Denmark	530 (2.7)	538 (2.9) ▲	546 (3.5)	550 (3.6)	530 (4.3)	533 (4.2)
England	536 (4.3)	542 (3.8)	544 (4.6)	547 (4.1)	551 (6.3)	547 (4.9)
Finland	538 (2.5)	552 (2.8) ▲	544 (3.5)	543 (3.7)	549 (4.7)	553 (4.7)
1 Georgia	474 (2.9)	472 (3.9)	416 (4.7)	408 (5.2)	441 (4.1) ▲	425 (4.9)
Germany	514 (2.7)	526 (2.7) ▲	532 (3.1)	540 (2.9) ▲	546 (3.9)	545 (3.6)
2 Hong Kong SAR	600 (3.2)	608 (4.0) ▲	600 (3.3)	609 (4.1) ▲	593 (3.5)	593 (4.8)
Hungary	513 (3.4)	517 (3.8)	521 (4.2)	520 (4.1)	510 (4.9)	510 (4.8)
Iran, Islamic Rep. of	439 (5.3)	440 (5.1)	434 (5.9)	435 (5.8)	397 (6.1)	398 (6.7)
Ireland	530 (3.8)	535 (3.3)	519 (4.4)	521 (3.8)	524 (3.6)	522 (5.0)
Italy	505 (3.1)	515 (3.0) ▲	508 (3.5)	517 (3.5) ▲	491 (3.1)	498 (4.1)
Japan	581 (2.0)	587 (2.2) ▲	588 (2.4)	591 (2.6)	591 (2.3)	588 (4.4)
2 Kazakhstan	511 (4.5)	518 (4.3) ▲	486 (5.4)	496 (5.8) ▲	477 (6.6)	474 (6.2)
Korea, Rep. of	600 (2.3)	610 (2.2) ▲	606 (3.0)	608 (2.0)	607 (3.9)	599 (3.5)
1 Ж Kuwait	348 (4.5) ▲	315 (6.6)	340 (4.6) ▲	298 (7.5)	364 (4.3) ▲	327 (7.4)
1 2 Lithuania	536 (2.9)	539 (2.9)	531 (3.7)	530 (3.3)	528 (3.0)	524 (4.1)
Malta	493 (1.9)	502 (2.8) ▲	484 (2.1)	489 (2.0)	497 (2.5)	499 (3.6)
Ж Morocco	344 (3.8)	337 (4.7)	352 (4.7)	348 (5.3)	278 (5.7) ▲	264 (5.5)
† Netherlands	538 (2.3)	549 (2.1) ▲	523 (2.2)	525 (4.1)	557 (2.9)	562 (4.4)
New Zealand	481 (3.2)	485 (3.1)	482 (2.9)	484 (3.1)	496 (3.3) ▲	487 (3.6)
† Northern Ireland	566 (3.3)	567 (3.8)	561 (3.8)	559 (4.3)	558 (3.8)	552 (4.1)
‡ Norway	484 (3.2)	493 (4.0) ▲	505 (3.9)	508 (3.8)	496 (4.3)	492 (4.7)
Ψ Oman	394 (3.4) ▲	373 (3.6)	390 (3.7) ▲	363 (3.6)	396 (3.4) ▲	366 (3.7)
Poland	474 (2.7)	486 (2.7) ▲	472 (2.9)	478 (3.4)	486 (5.4)	491 (3.7)
Portugal	519 (4.5)	525 (3.6)	546 (4.5)	550 (4.9)	544 (3.5)	552 (3.7)
2 Qatar	421 (4.9)	413 (3.9)	411 (4.8) ▲	388 (4.7)	425 (5.3) ▲	409 (5.7)
Romania	496 (6.2)	498 (5.9)	468 (7.1)	469 (6.1)	460 (7.6)	453 (6.9)
Russian Federation	544 (3.4)	545 (3.5)	545 (4.1)	538 (4.9)	535 (5.3)	530 (4.6)
Saudi Arabia	413 (5.0)	408 (10.7)	418 (5.5) ▲	390 (11.9)	413 (6.8)	392 (9.9)
2 Serbia	525 (3.7)	532 (3.5)	494 (4.7)	499 (4.2)	502 (4.3)	503 (4.3)
2 Singapore	621 (3.7)	617 (3.8)	591 (3.9)	588 (4.0)	591 (4.1)	584 (4.4)
Slovak Republic	507 (4.1)	515 (3.7) ▲	494 (4.7)	506 (4.3) ▲	502 (5.6)	506 (4.2)
Slovenia	496 (2.6)	510 (3.4) ▲	524 (2.8)	528 (3.1)	530 (2.7)	535 (3.7)
Spain	479 (3.2)	494 (3.6) ▲	473 (3.2)	479 (3.7)	474 (3.9)	484 (4.3) ▲
Sweden	497 (2.8)	504 (2.7) ▲	497 (3.0)	502 (2.8)	525 (3.9)	522 (3.6)
Thailand	468 (4.6) ▲	460 (5.1)	444 (5.8) ▲	430 (6.4)	478 (5.6) ▲	456 (5.7)
Ψ Tunisia	391 (4.1)	389 (4.1)	336 (4.9) ▲	324 (5.4)	305 (6.5) ▲	295 (5.6)
Turkey	475 (5.4)	478 (4.4)	451 (5.7)	443 (5.2)	481 (6.0)	475 (5.2)
United Arab Emirates	439 (2.9)	436 (3.7)	426 (3.3) ▲	410 (4.1)	444 (2.7) ▲	430 (3.4)
2 United States	538 (2.1)	548 (2.2) ▲	531 (2.4)	539 (2.4) ▲	542 (2.2)	547 (1.8) ▲
Ж Yemen	270 (7.9) ▲	254 (7.0)	202 (7.5) ▲	186 (7.3)	209 (7.1)	200 (7.1)
International Avg.	493 (0.5)	496 (0.6) ▲	485 (0.6) ▲	483 (0.7)	486 (0.7) ▲	482 (0.7)

▲ Average significantly higher than other gender

Ж Average achievement not reliably measured because the percentage of students with achievement too low for estimation exceeds 25%.

Ψ Reservations about reliability of average achievement because the percentage of students with achievement too low for estimation does not exceed 25% but exceeds 15%.

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 3.9: Achievement in Mathematics Content Domains by Gender (Continued)

Country	Number		Geometric Shapes and Measures		Data Display	
	Girls	Boys	Girls	Boys	Girls	Boys
Sixth Grade Participants						
Botswana	431 (3.9) ▲	410 (4.5)	408 (4.3) ▲	399 (5.5)	437 (4.3) ▲	417 (4.6)
Ψ Honduras	410 (5.5)	425 (5.0) ▲	359 (7.2)	372 (6.7)	371 (7.9)	383 (7.4)
Ж Yemen	370 (7.3)	366 (6.1)	309 (7.8)	301 (7.3)	350 (7.6) ▲	328 (7.5)
Benchmarking Participants						
2 Alberta, Canada	500 (3.4)	510 (3.2) ▲	491 (3.6)	500 (3.5)	521 (3.4)	527 (3.8)
Ontario, Canada	500 (3.6)	508 (3.9) ▲	533 (3.9)	538 (3.7)	536 (3.8)	536 (3.9)
Quebec, Canada	526 (3.0)	537 (3.1) ▲	530 (4.1)	542 (3.0) ▲	535 (3.8)	541 (4.5)
Abu Dhabi, UAE	425 (5.1)	415 (7.1)	413 (5.9) ▲	390 (7.6)	429 (4.6) ▲	408 (6.3)
Dubai, UAE	470 (3.5)	477 (3.8)	451 (3.8)	447 (4.8)	473 (4.4)	470 (4.6)
1 3 Florida, US	543 (3.6)	553 (4.2) ▲	543 (4.3)	548 (4.2)	541 (4.9)	542 (4.6)
1 2 North Carolina, US	558 (4.2)	570 (4.4) ▲	528 (5.0)	544 (5.9) ▲	557 (6.6)	560 (5.8)

▲ Average significantly higher than other gender

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 3.10: Achievement in Mathematics Content Domains by Gender

TIMSS 2011 Mathematics 8th Grade

Country	Number		Algebra		Geometry		Data and Chance	
	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys
Armenia	475 (2.9)	473 (3.0)	503 (3.4) ▲	488 (3.5)	453 (4.3)	448 (3.6)	385 (4.7) ▲	368 (4.0)
Australia	505 (4.9)	521 (7.8) ▲	489 (5.1)	489 (7.5)	492 (5.0)	506 (7.6)	528 (5.3)	541 (8.7)
Ψ Bahrain	414 (2.6) ▲	380 (3.1)	448 (2.4) ▲	402 (2.8)	416 (3.1) ▲	380 (3.9)	430 (3.2) ▲	385 (4.8)
Chile	402 (3.7)	425 (3.4) ▲	402 (4.1)	404 (4.3)	412 (3.6)	427 (4.4) ▲	417 (4.0)	435 (3.6) ▲
Chinese Taipei	597 (4.0)	599 (3.6)	636 (4.7) ▲	621 (4.3)	629 (4.8)	621 (4.0)	585 (3.5)	583 (4.4)
‡ England	510 (6.0)	515 (6.9)	495 (5.8)	485 (6.6)	501 (5.8)	495 (6.7)	542 (7.2)	544 (8.8)
Finland	522 (2.5)	531 (3.1) ▲	501 (3.1) ▲	484 (3.3)	505 (3.2)	499 (3.5)	544 (3.4)	541 (3.6)
1 Georgia	431 (4.2)	439 (3.9)	453 (4.2)	448 (4.5)	405 (5.8)	408 (4.8)	393 (4.9)	391 (5.8)
Ж Ghana	307 (5.0)	333 (4.7) ▲	348 (4.4)	368 (4.2) ▲	303 (5.0)	327 (4.6) ▲	287 (4.9)	304 (5.2) ▲
Hong Kong SAR	588 (5.1)	588 (4.5)	586 (5.1)	579 (4.4)	604 (5.3) ▲	591 (5.3)	585 (5.2)	578 (4.7)
Hungary	503 (4.2)	516 (4.6) ▲	500 (4.3)	493 (4.7)	499 (4.4)	503 (4.9)	511 (4.3)	523 (5.5) ▲
Ψ Indonesia	380 (5.2) ▲	370 (5.1)	402 (4.5) ▲	382 (3.8)	382 (5.6)	372 (5.9)	381 (5.1) ▲	371 (5.2)
Ψ Iran, Islamic Rep. of	390 (6.5)	412 (6.4) ▲	426 (6.0)	419 (5.7)	435 (6.3)	439 (6.5)	387 (6.1)	398 (6.3)
3 Israel	516 (4.1)	519 (5.0)	529 (4.6) ▲	512 (5.8)	501 (5.2)	491 (5.9)	518 (5.1)	513 (5.7)
Italy	485 (3.6)	507 (2.9) ▲	489 (3.3)	493 (2.8)	510 (3.4)	513 (4.7)	492 (4.2)	506 (4.8) ▲
Japan	549 (3.6)	565 (3.7) ▲	568 (3.6)	572 (3.9)	582 (4.2)	589 (3.8)	576 (3.4)	583 (3.7) ▲
Ψ Jordan	398 (4.4)	383 (6.7)	451 (4.2) ▲	413 (6.2)	417 (4.4) ▲	397 (5.9)	393 (4.1) ▲	367 (6.2)
Kazakhstan	476 (4.4)	482 (4.5)	509 (4.6)	503 (5.2)	489 (4.9)	493 (5.3)	442 (4.7)	446 (5.9)
Korea, Rep. of	610 (3.6)	626 (2.7) ▲	617 (4.2)	616 (3.5)	611 (3.3)	613 (3.8)	611 (3.1)	621 (3.1) ▲
Lebanon	443 (3.9)	462 (5.1) ▲	468 (4.3)	475 (4.7)	441 (4.3)	455 (4.9) ▲	390 (5.6)	397 (6.9)
1 Lithuania	500 (3.3)	502 (2.9)	503 (3.4) ▲	482 (3.8)	506 (3.9) ▲	494 (3.6)	518 (3.6)	513 (3.6)
Ψ Macedonia, Rep. of	416 (5.8)	421 (5.6)	457 (5.9) ▲	440 (5.8)	426 (6.7) ▲	413 (6.6)	390 (6.6)	388 (6.8)
Malaysia	460 (5.8) ▲	441 (6.8)	440 (5.1) ▲	419 (6.4)	438 (6.2) ▲	425 (7.4)	436 (5.3) ▲	422 (6.7)
Ж Morocco	378 (2.8)	381 (3.2)	360 (2.7) ▲	353 (3.5)	386 (2.1)	394 (3.7) ▲	332 (3.1)	333 (2.5)
New Zealand	478 (6.1)	505 (6.5) ▲	467 (5.5)	477 (6.2) ▲	471 (5.5)	494 (6.2) ▲	505 (7.4)	521 (7.1) ▲
Norway	491 (3.2)	494 (3.4)	435 (3.2) ▲	429 (3.1)	464 (3.8)	458 (4.6)	516 (4.2)	511 (4.8)
Ψ Oman	371 (3.8) ▲	329 (3.9)	419 (3.1) ▲	346 (3.7)	404 (3.4) ▲	349 (3.6)	373 (3.9) ▲	309 (4.3)
Ψ Palestinian Nat'l Auth.	406 (4.4)	393 (5.5)	431 (4.4) ▲	405 (5.4)	425 (4.9) ▲	406 (5.8)	379 (4.7) ▲	355 (5.6)
Ψ Qatar	410 (6.1)	407 (5.4)	433 (5.7)	417 (5.8)	395 (6.1)	379 (5.4)	393 (6.1)	386 (5.9)
Romania	449 (4.9)	446 (4.3)	489 (5.1) ▲	466 (4.4)	457 (5.3)	450 (5.4)	431 (4.8)	427 (4.9)
2 Russian Federation	528 (3.4)	540 (3.8) ▲	560 (4.1) ▲	552 (4.0)	532 (4.2)	534 (4.6)	510 (3.9)	512 (5.0)
Ψ Saudi Arabia	398 (4.8)	388 (8.1)	412 (5.1) ▲	388 (8.5)	371 (5.1)	358 (9.4)	389 (5.0)	384 (8.1)
2 Singapore	613 (3.6)	609 (4.6)	622 (4.0) ▲	607 (5.2)	612 (3.7)	607 (4.8)	609 (4.6)	605 (5.2)
Slovenia	502 (3.0)	519 (3.1) ▲	496 (3.2)	490 (3.1)	501 (3.5)	507 (3.7)	516 (3.3)	520 (4.1)
Sweden	502 (2.1)	505 (2.3)	464 (2.6) ▲	454 (2.7)	458 (2.9)	454 (3.4)	508 (3.5)	501 (3.1)
Ψ Syrian Arab Republic	364 (4.5)	381 (5.1) ▲	389 (5.8)	394 (6.2)	379 (6.1)	395 (6.5) ▲	340 (5.8)	346 (5.9)
Thailand	430 (5.0) ▲	418 (5.6)	436 (4.8) ▲	412 (5.5)	418 (5.2)	411 (7.8)	438 (4.8) ▲	422 (5.0)
Tunisia	420 (3.7)	444 (3.0) ▲	417 (3.3)	421 (3.9)	418 (3.7)	435 (3.2) ▲	389 (4.3)	408 (3.5) ▲
Turkey	433 (4.1)	437 (4.6)	464 (4.2) ▲	446 (4.9)	461 (4.4) ▲	447 (4.9)	474 (4.3) ▲	461 (4.9)
Ukraine	466 (4.1)	479 (5.2) ▲	491 (4.4)	483 (5.6)	472 (4.6)	480 (6.0)	469 (4.5)	472 (5.1)
United Arab Emirates	462 (2.9)	456 (3.3)	478 (2.9) ▲	458 (3.2)	444 (3.2) ▲	418 (3.5)	450 (3.0) ▲	431 (3.6)
2 United States	508 (3.3)	520 (3.1) ▲	513 (3.0)	510 (2.7)	482 (3.3)	487 (3.0)	525 (4.1)	530 (3.4)
International Avg.	464 (0.7)	468 (0.7) ▲	476 (0.7) ▲	464 (0.7)	464 (0.7) ▲	461 (0.8)	459 (0.7) ▲	456 (0.8)

▲ Average significantly higher than other gender

Ж Average achievement not reliably measured because the percentage of students with achievement too low for estimation exceeds 25%.

Ψ Reservations about reliability of average achievement because the percentage of students with achievement too low for estimation does not exceed 25% but exceeds 15%.

See Appendix C.3 for target population coverage notes 1, 2, and 3. See Appendix C.9 for sampling guidelines and sampling participation notes †, ‡, and ‡.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 3.10: Achievement in Mathematics Content Domains by Gender (Continued)

TIMSS 2011 Mathematics 8th Grade

Country	Number		Algebra		Geometry		Data and Chance	
	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys
Ninth Grade Participants								
Ψ Botswana	400 (4.0) ▲	383 (3.3)	415 (3.7) ▲	399 (3.3)	381 (4.7)	380 (3.9)	398 (4.3) ▲	383 (3.1)
2 Ж Honduras	341 (3.8)	367 (4.4) ▲	320 (5.3)	335 (4.8) ▲	301 (5.2)	317 (4.8) ▲	307 (6.6)	334 (4.8) ▲
Ж South Africa	358 (3.1)	359 (3.3)	367 (2.8) ▲	356 (3.6)	310 (4.0)	320 (4.0)	336 (4.0)	329 (4.3)
Benchmarking Participants								
2 Alberta, Canada	519 (3.6)	528 (3.2) ▲	489 (3.3) ▲	482 (2.7)	480 (3.3)	489 (3.1) ▲	529 (4.6)	529 (3.9)
2 Ontario, Canada	515 (3.3)	523 (3.1) ▲	501 (2.6) ▲	492 (3.0)	512 (3.2)	511 (3.2)	529 (5.0)	532 (4.4)
Quebec, Canada	540 (3.0)	546 (2.8) ▲	519 (3.4)	512 (3.3)	527 (3.5)	530 (3.0)	548 (4.3)	549 (4.3)
Abu Dhabi, UAE	448 (4.1)	457 (5.6)	462 (3.9)	457 (5.9)	429 (4.8)	419 (6.5)	436 (4.6)	432 (6.4)
Dubai, UAE	482 (4.4)	477 (5.4)	498 (4.5) ▲	479 (5.2)	466 (5.4) ▲	441 (6.5)	477 (5.3)	459 (6.2)
1 Alabama, US	459 (7.9)	467 (7.2)	475 (5.8) ▲	466 (5.6)	444 (6.0)	442 (7.3)	477 (8.7)	483 (8.3)
1 2 California, US	486 (6.2)	499 (5.2) ▲	512 (5.8)	506 (5.3)	452 (6.7)	457 (5.3)	488 (7.3)	501 (6.6)
1 Colorado, US	515 (5.7)	527 (5.1) ▲	513 (5.8)	511 (5.1)	503 (5.9)	508 (6.7)	541 (6.5)	540 (6.2)
1 2 Connecticut, US	524 (5.2)	530 (5.6)	516 (5.9) ▲	505 (5.7)	490 (5.9)	491 (5.5)	551 (7.5)	542 (7.2)
1 2 Florida, US	509 (7.3)	525 (7.8) ▲	513 (6.7)	512 (7.0)	495 (6.9)	502 (7.8)	515 (9.5)	541 (10.3) ▲
1 2 Indiana, US	520 (5.3)	536 (6.3) ▲	519 (5.3)	521 (6.1)	498 (5.0)	499 (6.7)	538 (6.0)	552 (7.1) ▲
1 2 Massachusetts, US	560 (6.4)	575 (6.5) ▲	562 (6.3)	557 (6.0)	548 (5.9)	547 (6.0)	575 (8.8)	594 (7.7) ▲
1 Minnesota, US	554 (5.7)	559 (6.0)	546 (5.1)	539 (5.6)	511 (6.4)	520 (7.2)	569 (7.1)	573 (7.8)
1 3 North Carolina, US	540 (6.7)	554 (8.8) ▲	538 (6.8)	536 (7.8)	510 (7.4)	521 (10.0)	543 (8.2)	553 (9.9)

▲ Average significantly higher than other gender

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 3.11: Achievement in Mathematics Cognitive Domains by Gender

TIMSS 2011 Mathematics 4th Grade

Country	Knowing		Applying		Reasoning	
	Girls	Boys	Girls	Boys	Girls	Boys
Armenia	463 (4.2)	459 (4.3)	450 (4.5) ▲	443 (4.1)	444 (4.6)	441 (4.5)
Australia	513 (4.0)	520 (4.6)	517 (3.5)	521 (3.7)	509 (3.0)	518 (3.8) ▲
Austria	505 (2.6)	510 (3.1)	499 (2.9)	512 (3.3) ▲	505 (3.4)	521 (4.0) ▲
2 Azerbaijan	476 (7.1)	470 (6.5)	461 (6.6)	454 (6.2)	449 (6.5)	441 (6.4)
Bahrain	440 (4.7)	436 (4.8)	436 (4.7)	426 (4.3)	439 (4.5)	440 (4.5)
Belgium (Flemish)	562 (2.1)	567 (2.5)	542 (2.6)	549 (2.4) ▲	527 (3.4)	537 (2.7) ▲
Chile	452 (3.2)	459 (2.9) ▲	459 (3.2)	467 (3.0) ▲	461 (3.0)	476 (3.3) ▲
Chinese Taipei	599 (3.0)	599 (2.5)	596 (2.6)	591 (2.3)	578 (3.8)	577 (2.5)
2 Croatia	490 (3.0)	499 (2.5) ▲	477 (2.5)	491 (2.4) ▲	487 (2.9)	498 (4.1) ▲
Czech Republic	497 (3.0)	507 (3.2) ▲	505 (3.2)	519 (3.2) ▲	520 (3.1)	525 (3.3)
2 Denmark	527 (3.1)	536 (3.2) ▲	537 (3.0)	541 (3.5)	541 (3.5)	544 (3.2)
England	550 (4.6)	554 (5.0)	540 (4.1)	544 (4.2)	529 (5.0)	533 (3.8)
Finland	543 (2.8)	553 (3.1) ▲	540 (3.0)	548 (3.1) ▲	543 (3.2)	548 (3.2)
1 Georgia	452 (3.4)	447 (4.7)	452 (3.3) ▲	443 (4.5)	452 (3.6)	449 (4.4)
Germany	518 (2.5)	529 (2.9) ▲	525 (2.6)	531 (2.8)	526 (3.1)	538 (3.8) ▲
2 Hong Kong SAR	618 (3.0)	620 (4.1)	594 (3.2)	600 (3.9) ▲	584 (3.7)	593 (4.3) ▲
Hungary	518 (4.0)	520 (4.2)	511 (3.3)	516 (4.0)	514 (4.0)	515 (4.3)
Iran, Islamic Rep. of	436 (5.6)	434 (5.9)	426 (5.7)	428 (5.5)	419 (4.7)	426 (4.8)
Ireland	539 (4.1)	540 (4.0)	528 (3.7)	530 (3.3)	507 (4.4)	512 (3.3)
Italy	505 (2.9)	514 (3.3) ▲	501 (3.4)	511 (3.2) ▲	501 (4.0)	510 (4.0) ▲
Japan	589 (2.0)	591 (2.6)	577 (1.8)	581 (2.2)	592 (2.1)	591 (2.9)
2 Kazakhstan	498 (5.3)	507 (4.8) ▲	497 (4.9)	501 (5.6)	499 (5.0)	503 (5.1)
Korea, Rep. of	613 (2.4)	616 (2.2)	597 (2.1)	602 (2.7) ▲	597 (3.5)	608 (3.3) ▲
1 ж Kuwait	362 (4.6) ▲	320 (6.0)	348 (4.1) ▲	310 (7.2)	341 (4.1) ▲	316 (5.5)
1 2 Lithuania	524 (3.1)	526 (3.7)	539 (3.2)	541 (3.3)	537 (3.0)	536 (3.2)
Malta	500 (1.9)	508 (2.2) ▲	494 (2.0)	499 (2.8)	470 (2.5)	480 (2.5) ▲
ж Morocco	323 (4.9)	318 (4.6)	334 (4.4)	330 (4.9)	350 (4.9)	344 (5.6)
† Netherlands	534 (2.8)	542 (1.8) ▲	536 (2.3)	546 (2.2) ▲	540 (2.9)	548 (3.1) ▲
New Zealand	475 (3.9)	477 (3.8)	491 (3.0)	489 (2.7)	489 (3.0)	491 (2.9)
† Northern Ireland	578 (4.0)	582 (4.5)	566 (3.2)	564 (3.8)	538 (4.0)	537 (4.1)
‡ Norway	483 (4.3)	491 (3.2)	496 (3.2)	503 (3.5) ▲	497 (3.1)	505 (4.7)
Ψ Oman	397 (3.4) ▲	363 (3.9)	392 (3.0) ▲	371 (3.7)	401 (2.6) ▲	381 (3.3)
Poland	470 (3.2)	480 (2.8) ▲	475 (2.9)	484 (3.1) ▲	488 (3.6)	498 (3.0) ▲
Portugal	527 (4.0)	535 (4.0) ▲	532 (4.6)	536 (4.2)	528 (4.8)	533 (4.4)
2 Qatar	418 (5.5) ▲	405 (4.4)	418 (4.7) ▲	405 (3.8)	423 (5.3) ▲	410 (4.9)
Romania	483 (7.1)	485 (6.6)	478 (6.8)	478 (5.9)	488 (6.8)	485 (5.8)
Russian Federation	541 (3.5)	541 (3.8)	540 (4.1)	539 (4.5)	550 (3.7)	546 (4.3)
Saudi Arabia	418 (5.7)	400 (11.5)	413 (5.6)	396 (10.6)	418 (5.4)	406 (10.4)
2 Serbia	517 (3.8)	523 (3.5)	506 (4.0)	516 (3.5) ▲	515 (5.2)	514 (4.2)
2 Singapore	631 (4.1)	627 (4.1)	603 (3.8)	600 (3.8)	591 (3.8)	585 (4.4)
Slovak Republic	503 (4.0)	509 (3.9) ▲	500 (4.3)	510 (4.4) ▲	507 (4.3)	514 (4.3) ▲
Slovenia	506 (3.0)	513 (3.7)	508 (2.7)	519 (3.5) ▲	507 (4.4)	524 (4.3) ▲
Spain	478 (3.5)	487 (3.7) ▲	478 (3.4)	488 (3.5) ▲	476 (3.7)	489 (3.4) ▲
Sweden	487 (2.8)	491 (3.0)	505 (2.7)	510 (2.6)	516 (4.0)	523 (2.9) ▲
Thailand	460 (5.2) ▲	446 (5.7)	465 (4.9) ▲	451 (5.7)	468 (4.6)	460 (5.9)
Ψ Tunisia	376 (4.9) ▲	365 (4.0)	349 (5.0)	344 (4.8)	337 (5.5)	332 (6.2)
Turkey	476 (6.2)	474 (5.6)	468 (5.4)	469 (5.0)	463 (5.4)	460 (4.3)
United Arab Emirates	442 (3.1)	433 (3.8)	434 (2.8)	426 (3.6)	436 (3.0)	431 (3.5)
2 United States	550 (2.3)	561 (2.2) ▲	534 (2.4)	543 (2.2) ▲	523 (2.4)	528 (2.2) ▲
ж Yemen	227 (7.3)	210 (8.4)	243 (7.8)	232 (7.1)	251 (7.8)	239 (6.9)
International Avg.	492 (0.6)	492 (0.6)	488 (0.6)	489 (0.6)	487 (0.6)	489 (0.6) ▲

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

▲ Average significantly higher than other gender

ж Average achievement not reliably measured because the percentage of students with achievement too low for estimation exceeds 25%.

Ψ Reservations about reliability of average achievement because the percentage of students with achievement too low for estimation does not exceed 25% but exceeds 15%.

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Exhibit 3.11: Achievement in Mathematics Cognitive Domains by Gender (Continued)

Country	Number		Geometric Shapes and Measures		Data Display	
	Girls	Boys	Girls	Boys	Girls	Boys
Sixth Grade Participants						
Botswana	434 (4.5) ▲	413 (5.4)	431 (4.3) ▲	410 (4.2)	407 (3.9) ▲	396 (4.6)
Ψ Honduras	379 (6.7)	391 (5.4) ▲	389 (6.5)	406 (5.7) ▲	396 (6.9)	410 (5.8) ▲
Ж Yemen	345 (7.9)	332 (7.1)	348 (7.7)	343 (6.9)	361 (8.8)	351 (6.6)
Benchmarking Participants						
2 Alberta, Canada	495 (3.5)	501 (3.0) ▲	502 (3.1)	513 (3.4) ▲	511 (3.6)	517 (4.0)
Ontario, Canada	505 (3.8)	515 (3.9) ▲	519 (3.7)	523 (4.1)	521 (3.4)	522 (3.6)
Quebec, Canada	532 (3.4)	541 (3.0) ▲	524 (3.1)	534 (2.7) ▲	529 (3.1)	539 (3.0) ▲
Abu Dhabi, UAE	426 (5.3) ▲	410 (7.4)	421 (4.9)	405 (7.0)	424 (4.8)	413 (6.5)
Dubai, UAE	470 (4.1)	473 (4.9)	464 (3.9)	467 (4.3)	461 (3.4)	465 (4.2)
1 3 Florida, US	565 (3.6)	571 (5.0)	537 (3.4)	546 (4.7) ▲	520 (4.7)	526 (4.3)
1 2 North Carolina, US	567 (4.9)	580 (4.7) ▲	544 (5.0)	562 (5.5) ▲	531 (4.8)	535 (4.9)

▲ Average significantly higher than other gender

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 3.12: Achievement in Mathematics Cognitive Domains by Gender

TIMSS 2011 Mathematics 8th Grade

Country	Knowing		Applying		Reasoning	
	Girls	Boys	Girls	Boys	Girls	Boys
Armenia	482 (3.3) ▲	470 (3.8)	462 (3.4) ▲	455 (3.6)	457 (4.1) ▲	446 (3.4)
Australia	502 (5.0)	506 (7.3)	500 (4.5)	512 (6.9)	501 (4.8)	511 (7.1)
Ψ Bahrain	434 (3.6) ▲	389 (3.7)	417 (2.7) ▲	384 (3.8)	435 (3.4) ▲	395 (2.8)
Chile	399 (3.7)	412 (3.2) ▲	416 (3.4)	435 (2.8) ▲	415 (3.8)	429 (3.2) ▲
Chinese Taipei	618 (5.0) ▲	605 (4.2)	616 (4.0)	613 (4.3)	612 (4.1)	606 (3.9)
‡ England	503 (5.4)	500 (6.5)	508 (5.6)	509 (6.5)	513 (5.8)	507 (6.5)
Finland	510 (2.9)	507 (2.7)	521 (2.9)	519 (2.9)	515 (3.0) ▲	508 (3.1)
1 Georgia	439 (4.9)	436 (4.6)	421 (4.3)	428 (4.2)	414 (5.2)	414 (5.1)
Ж Ghana	318 (5.0)	343 (4.7) ▲	302 (5.2)	328 (4.6) ▲	313 (5.8)	334 (5.3) ▲
Hong Kong SAR	597 (4.9) ▲	585 (4.6)	590 (4.6)	585 (4.4)	582 (5.0)	578 (4.8)
Hungary	507 (4.3)	507 (4.2)	501 (4.1)	509 (4.0) ▲	501 (4.1)	503 (4.3)
Ψ Indonesia	386 (5.4) ▲	370 (5.0)	389 (5.4) ▲	379 (4.7)	391 (4.2) ▲	384 (4.3)
Ψ Iran, Islamic Rep. of	409 (6.1)	411 (6.0)	404 (6.3)	418 (6.0)	423 (5.7)	433 (6.0)
3 Israel	522 (3.8) ▲	510 (5.4)	516 (4.4)	510 (5.4)	522 (3.8)	517 (5.1)
Italy	489 (3.3)	499 (3.0) ▲	496 (2.5)	509 (2.6) ▲	492 (3.4)	500 (3.0) ▲
Japan	557 (3.0)	559 (4.1)	569 (2.9)	579 (3.6) ▲	575 (3.3)	583 (4.4)
Ψ Jordan	422 (4.8) ▲	389 (7.0)	408 (4.2) ▲	388 (6.1)	427 (4.9) ▲	404 (5.9)
Kazakhstan	490 (4.6)	489 (5.1)	481 (4.4)	488 (4.9)	483 (5.0)	482 (5.4)
Korea, Rep. of	613 (3.6)	619 (3.1)	613 (3.6)	621 (3.3) ▲	610 (3.3)	615 (3.3)
Lebanon	459 (4.2)	470 (5.0) ▲	430 (4.6)	443 (5.0) ▲	419 (5.1)	434 (5.9) ▲
1 Lithuania	508 (3.1) ▲	495 (3.2)	512 (2.8) ▲	503 (3.0)	495 (3.2)	490 (2.9)
Ψ Macedonia, Rep. of	434 (6.1)	427 (6.0)	420 (5.9)	415 (5.6)	425 (6.5)	422 (6.6)
Malaysia	456 (5.5) ▲	431 (6.6)	445 (5.1) ▲	432 (6.0)	432 (5.5) ▲	420 (6.5)
Ж Morocco	365 (2.9)	361 (2.7)	377 (2.3)	379 (2.4)	354 (3.2)	359 (3.0)
New Zealand	471 (5.5)	490 (6.2) ▲	481 (5.0)	500 (5.6) ▲	486 (5.3)	500 (6.1) ▲
Norway	467 (2.6)	463 (3.1)	480 (3.4)	480 (3.0)	480 (3.4)	476 (3.4)
Ψ Oman	397 (3.5) ▲	331 (4.4)	386 (3.4) ▲	333 (4.5)	396 (3.2) ▲	341 (4.1)
Ψ Palestinian Nat'l Auth.	421 (4.2) ▲	392 (5.7)	405 (4.2) ▲	388 (5.5)	412 (4.6)	397 (6.6)
Ψ Qatar	426 (5.9)	410 (5.7)	401 (6.0)	392 (5.8)	409 (6.1)	404 (5.9)
Romania	468 (5.4) ▲	453 (4.5)	456 (5.0)	451 (4.1)	461 (4.8) ▲	450 (4.0)
2 Russian Federation	550 (3.9)	547 (4.0)	536 (4.0)	541 (3.8)	532 (4.3)	530 (4.1)
Ψ Saudi Arabia	414 (4.2) ▲	391 (8.0)	374 (4.2)	375 (8.6)	396 (4.8)	379 (7.9)
2 Singapore	624 (4.0) ▲	611 (4.5)	616 (3.9)	609 (4.7)	609 (4.1)	600 (5.7)
Slovenia	507 (3.0)	509 (3.2)	497 (2.5)	507 (2.8) ▲	500 (2.9)	500 (3.5)
Sweden	479 (2.5)	477 (2.2)	490 (2.2)	489 (2.8)	481 (2.6) ▲	474 (3.1)
Ψ Syrian Arab Republic	368 h(5.3)	381 (5.9)	369 (5.6)	389 (5.4) ▲	369 (5.9)	373 (7.4)
Thailand	432 (4.8) ▲	413 (5.7)	434 (4.3) ▲	422 (5.0)	435 (4.2) ▲	422 (5.5)
Tunisia	417 (3.2)	433 (3.6) ▲	412 (3.1)	432 (3.3) ▲	414 (3.1)	431 (3.1) ▲
Turkey	445 (4.1) ▲	436 (5.0)	462 (4.0)	456 (4.8)	469 (3.7) ▲	460 (4.1)
Ukraine	482 (4.7)	480 (5.6)	474 (4.8)	487 (5.1) ▲	466 (4.2)	469 (5.7)
United Arab Emirates	477 (2.8) ▲	457 (3.1)	449 (2.8) ▲	435 (3.3)	457 (2.7) ▲	440 (3.3)
2 United States	519 (3.1)	519 (2.8)	500 (3.1)	506 (3.0) ▲	501 (3.0)	506 (2.8) ▲
International Avg.	471 (0.7) ▲	464 (0.7)	465 (0.6)	465 (0.7)	466 (0.7) ▲	463 (0.8)

▲ Average significantly higher than other gender

Ж Average achievement not reliably measured because the percentage of students with achievement too low for estimation exceeds 25%.

Ψ Reservations about reliability of average achievement because the percentage of students with achievement too low for estimation does not exceed 25% but exceeds 15%.

See Appendix C.3 for target population coverage notes 1, 2, and 3. See Appendix C.9 for sampling guidelines and sampling participation notes †, ‡, and ‡.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 3.12: Achievement in Mathematics Cognitive Domains by Gender (Continued)

Country	Knowing		Applying		Reasoning	
	Girls	Boys	Girls	Boys	Girls	Boys
Ninth Grade Participants						
Ψ Botswana	412 (2.8) ▲	395 (3.1)	387 (2.9) ▲	379 (3.6)	402 (2.6) ▲	393 (2.9)
2 ✳ Honduras	327 (5.3)	344 (4.8) ▲	328 (4.2)	354 (3.7) ▲	310 (5.7)	337 (5.2) ▲
✳ South Africa	354 (3.0)	351 (3.2)	336 (3.5)	337 (3.3)	366 (2.9)	360 (3.5)
Benchmarking Participants						
2 Alberta, Canada	501 (2.9)	499 (3.1)	502 (3.3)	508 (2.8) ▲	509 (3.4)	515 (3.3)
2 Ontario, Canada	505 (2.8)	501 (3.0)	509 (2.7)	511 (3.0)	523 (2.8)	525 (3.6)
Quebec, Canada	530 (3.5)	526 (3.0)	535 (3.4)	537 (3.0)	528 (3.6)	530 (2.7)
Abu Dhabi, UAE	461 (4.2)	458 (5.6)	433 (4.7)	436 (6.1)	443 (4.6)	441 (5.9)
Dubai, UAE	498 (4.3) ▲	479 (5.4)	472 (4.6)	459 (5.7)	478 (4.6)	462 (5.5)
1 Alabama, US	478 (6.6)	475 (6.5)	456 (7.3)	459 (6.8)	454 (7.2)	454 (7.9)
1 2 California, US	508 (6.2)	507 (5.0)	477 (6.4)	483 (5.7)	478 (5.8)	488 (5.0) ▲
1 Colorado, US	518 (5.8)	520 (4.8)	513 (5.5)	517 (5.3)	516 (5.5)	519 (5.4)
1 2 Connecticut, US	531 (5.3)	525 (6.5)	511 (5.2)	510 (5.6)	512 (5.5)	509 (6.0)
1 2 Florida, US	522 (7.3)	525 (7.9)	498 (7.7)	510 (8.1) ▲	500 (7.5)	509 (7.9)
1 2 Indiana, US	530 (5.3)	537 (5.9)	512 (5.4)	520 (6.3) ▲	507 (5.3)	515 (6.4) ▲
1 2 Massachusetts, US	567 (6.5)	570 (6.2)	549 (6.4)	560 (5.8) ▲	561 (6.6)	562 (5.9)
1 Minnesota, US	558 (5.2)	554 (5.9)	538 (6.0)	542 (6.2)	536 (6.2)	536 (5.6)
1 3 North Carolina, US	548 (7.0)	549 (8.7)	526 (7.0)	536 (9.0)	529 (6.7)	533 (8.3)

▲ Average significantly higher than other gender

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011



Chapter 4

Home Environment Support for Mathematics Achievement

The importance of an early start in school was related to higher mathematics achievement in TIMSS 2011. Fourth grade students had higher mathematics achievement if their parents reported that they often engaged in early numeracy activities with their children, that their children attended preschool, and that they started school able to do early numeracy tasks (e.g., simple addition and subtraction). Home resources for learning and high expectation were related to higher average achievement at the fourth and eighth grades.

Considerable research supports the fundamental importance of a supportive home environment in shaping children's achievement in school. Internationally, IEA studies in mathematics through four cycles of TIMSS have found a strong positive relationship between students' mathematics achievement at the fourth and eighth grades and home environments that foster learning.

This chapter presents the fourth grade TIMSS 2011 mathematics achievement results in relation to parents' reports about their children's home resources for learning and early numeracy experiences. The parents' data were collected using the *TIMSS & PIRLS 2011 Learning to Read Survey*, in which students' parents or primary caregivers were asked to provide information about their child's early literacy and numeracy experiences, and so are available only for countries that administered both TIMSS and PIRLS to the same fourth grade students. For the eighth grade, mathematics achievement is presented in relation to students' own reports of aspects of their home environments.

Home Resources for Learning

The *TIMSS & PIRLS 2011 Learning to Read Survey* asked students' parents to report on the availability of three key home resources highly related to student achievement in school:

- Parents' education;
- Parents' occupation; and
- Number of children's books in the home.

In addition, students were asked about:

- Number of books in the home; and
- Availability of two study supports—An Internet connection and their own room.

Research consistently shows a strong positive relationship between achievement and socioeconomic status (SES), or indicators of socioeconomic status such as parents' or caregivers' level of education or occupation. TIMSS, PIRLS, and PISA have found strong positive relationships between level of parents' education and/or occupation and their children's educational attainment. In general, higher levels of education can lead to careers in higher paying professions, higher socioeconomic status, and more home resources. Family income also has been shown to have a powerful influence on students' achievement in reading and mathematics (Dahl & Lochner, 2005). However, the benefits of higher levels of parents' education can extend to having more positive

beliefs and higher expectations toward educational achievement transfer to their children. Availability of reading material in the home likewise is strongly related to achievement in mathematics and science as well as in reading. IEA's TIMSS studies have consistently shown that students with a large number of books in the home have higher achievement in mathematics and science.

Exhibit 4.1 presents the results for the TIMSS 2011 Home Resources for Learning scale, which was created based on parents' and students' reports about the five types of home resources described above. Results are shown for countries that administered both TIMSS and PIRLS fourth grade assessments to the same fourth grade students. The second page of the exhibit provides detail about the questions forming the scale and the categorization of responses. Students were scored according to the availability of the five home resources, with **Many Resources** corresponding to more than 100 books in the home, having both their own room and an Internet connection, more than 25 children's books, at least one parent having completed university, and one with a professional occupation, on average. **Few Resources** corresponds, on average, to having 25 or fewer books, neither of the home study supports, 10 or fewer children's books, neither parent having gone beyond upper secondary school, and neither having a business, clerical, or professional occupation.

Countries are ordered by the percentage of students in the **Many Resources** category, with the fourth grade countries on the first page of the exhibit and the sixth grade and benchmarking participants on the second page. Internationally, on average, almost three-quarters of the fourth grade students (74%) were assigned to the **Some Resources** category. Seventeen percent, on average, were in the **Many Resources** category and nine percent internationally were in the **Few Resources** category, with a 119-point difference in their average mathematics achievement (555 vs. 436). Students in the countries participating at the sixth grade had relatively fewer home resources, comparable to the fourth-grade countries with the lowest levels.

Exhibit 4.2 provides supporting detail about the availability of the specific home resources included in the Home Resources for Learning scale for the fourth grade assessment. The exhibit presents data on two components (More than 100 Books in Their Home as well as both Own Room and Internet Connection in Home) for all participants in the fourth grade TIMSS assessment, as well as data on three additional resources for countries that participated in both TIMSS and PIRLS with the same students. On average, across all of the countries participating in TIMSS 2011 at the fourth grade, one-fourth of the

Exhibit 4.1: Home Resources for Learning*

TIMSS 2011 4th Grade Mathematics

Reported by Parents, except Number of Books and Study Supports Reported by Students

Students were scored according to their own and their parents' responses concerning the availability of five resources on the *Home Resources for Learning* scale. Students with **Many Resources** had a score of at least 11.9, which is the point on the scale corresponding to students reporting they had more than 100 books in the home and two home study supports, and parents reporting that they had more than 25 children's books in the home, that at least one parent had finished university, and that at least one parent had a professional occupation, on average. Students with **Few Resources** had a score no higher than 7.3, which is the scale point corresponding to students reporting that they had 25 or fewer books in the home and neither of the two home study supports, and parents reporting that they had 10 or fewer children's books in the home, that neither parent had gone beyond upper-secondary education, and that neither parent was a small business owner or had a clerical or professional occupation, on average. All other students were assigned to the **Some Resources** category.

Country	Many Resources		Some Resources		Few Resources		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Norway	42 (1.6)	517 (3.3)	57 (1.6)	483 (2.7)	0 (0.1)	~ ~	11.5 (0.06)
Australia s	41 (1.5)	566 (3.6)	59 (1.5)	510 (3.2)	1 (0.2)	~ ~	11.5 (0.06)
Sweden	39 (1.6)	535 (2.6)	60 (1.6)	493 (1.8)	1 (0.2)	~ ~	11.4 (0.05)
Finland	33 (1.4)	571 (2.7)	67 (1.4)	535 (2.7)	0 (0.1)	~ ~	11.2 (0.04)
Northern Ireland s	30 (1.5)	617 (4.7)	68 (1.6)	564 (3.9)	2 (0.4)	~ ~	10.9 (0.07)
Ireland	27 (1.4)	573 (3.3)	71 (1.4)	519 (2.4)	2 (0.3)	~ ~	10.8 (0.06)
Germany r	24 (1.4)	572 (2.8)	75 (1.4)	525 (2.1)	2 (0.3)	~ ~	10.7 (0.07)
Singapore	24 (0.9)	649 (3.3)	74 (0.9)	598 (3.2)	3 (0.3)	510 (7.9)	10.7 (0.03)
Hungary	21 (1.5)	585 (3.5)	69 (1.4)	516 (2.4)	11 (1.1)	425 (9.2)	10.1 (0.10)
Spain	19 (1.3)	524 (2.7)	77 (1.2)	481 (2.5)	5 (0.5)	434 (8.0)	10.3 (0.06)
Chinese Taipei	18 (1.0)	634 (2.3)	76 (1.0)	587 (2.0)	6 (0.4)	537 (5.4)	10.2 (0.06)
Czech Republic	18 (1.0)	552 (3.6)	81 (1.0)	505 (2.3)	1 (0.2)	~ ~	10.5 (0.04)
Slovenia	17 (0.8)	556 (2.9)	82 (0.9)	507 (2.3)	1 (0.2)	~ ~	10.4 (0.04)
Austria	17 (1.0)	547 (3.1)	82 (0.9)	504 (2.7)	2 (0.3)	~ ~	10.4 (0.06)
Portugal	16 (1.0)	569 (4.4)	75 (1.0)	533 (3.2)	9 (0.7)	493 (8.5)	9.9 (0.06)
Russian Federation	16 (1.0)	584 (4.3)	82 (1.1)	535 (3.7)	2 (0.4)	~ ~	10.4 (0.05)
Malta	16 (0.5)	545 (3.0)	83 (0.6)	497 (1.6)	1 (0.2)	~ ~	10.3 (0.02)
Poland	15 (1.0)	539 (3.3)	79 (1.0)	476 (1.8)	6 (0.6)	421 (6.4)	10.0 (0.06)
Slovak Republic	13 (0.8)	565 (4.5)	81 (1.1)	507 (2.9)	6 (1.0)	439 (12.8)	9.9 (0.06)
Qatar r	12 (0.9)	489 (10.4)	84 (0.9)	413 (3.3)	4 (0.4)	345 (10.0)	10.2 (0.05)
Hong Kong SAR	12 (1.0)	634 (3.7)	80 (0.9)	606 (2.6)	8 (0.7)	586 (5.6)	9.8 (0.08)
Georgia	12 (1.0)	501 (5.3)	80 (1.2)	451 (3.8)	8 (1.0)	402 (10.4)	9.9 (0.07)
Lithuania	11 (0.9)	588 (4.6)	83 (1.0)	532 (2.2)	6 (0.5)	478 (8.4)	9.8 (0.05)
United Arab Emirates	10 (0.5)	517 (4.7)	84 (0.6)	433 (2.1)	6 (0.4)	382 (4.9)	9.9 (0.03)
Italy	8 (0.7)	546 (5.4)	85 (0.8)	510 (2.6)	7 (0.6)	474 (6.6)	9.7 (0.05)
Croatia	7 (0.6)	537 (5.4)	88 (0.7)	489 (1.7)	5 (0.6)	442 (7.7)	9.7 (0.05)
Romania	7 (0.7)	580 (5.8)	67 (1.8)	496 (4.3)	26 (1.7)	426 (12.9)	8.7 (0.09)
Iran, Islamic Rep. of	4 (0.5)	534 (4.3)	57 (1.7)	450 (3.6)	39 (1.9)	394 (3.4)	8.1 (0.09)
Saudi Arabia	4 (0.6)	452 (10.4)	78 (1.2)	415 (5.5)	18 (1.2)	385 (9.3)	9.0 (0.07)
Oman	3 (0.3)	457 (9.4)	75 (0.8)	397 (3.2)	23 (0.8)	353 (3.9)	8.7 (0.04)
Morocco s	1 (0.2)	~ ~	46 (2.1)	355 (4.1)	53 (2.1)	336 (7.4)	7.2 (0.10)
Azerbaijan	1 (0.1)	~ ~	77 (1.3)	469 (6.5)	22 (1.3)	452 (6.1)	8.5 (0.04)
International Avg.	17 (0.2)	555 (0.9)	74 (0.2)	497 (0.6)	9 (0.1)	436 (1.8)	

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

* Available only for countries that administered both TIMSS and PIRLS to the same fourth grade students because this item was included in the PIRLS Home Questionnaire completed by parents.

Centerpoint of scale set at 10.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

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Exhibit 4.1: Home Resources for Learning* (Continued)

Country	Many Resources		Some Resources		Few Resources		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Sixth Grade Participants							
Botswana r	1 (0.4)	~ ~	57 (1.8)	449 (5.3)	42 (1.9)	401 (4.8)	7.7 (0.10)
Honduras s	0 (0.1)	~ ~	44 (2.5)	434 (7.6)	56 (2.5)	387 (5.6)	7.1 (0.12)
Benchmarking Participants							
Quebec, Canada	29 (1.6)	559 (2.8)	71 (1.6)	526 (2.5)	0 (0.1)	~ ~	11.1 (0.05)
Dubai, UAE	21 (0.5)	543 (4.1)	77 (0.6)	461 (1.8)	3 (0.2)	381 (9.0)	10.6 (0.02)
Abu Dhabi, UAE	8 (1.2)	500 (11.8)	85 (1.3)	417 (4.0)	6 (0.7)	369 (7.4)	9.8 (0.07)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Number of books in the home (students):

1) 0-10
2) 11-25
3) 26-100
4) 101-200
5) More than 200

Number of children's books in the home (parents):

1) 0-10
2) 11-25
3) 26-50
4) 51-100
5) More than 100

Number of home study supports (students):

1) None
2) Internet connection or own room
3) Both

Highest level of education of either parent (parents):

1) Finished some primary or lower secondary or did not go to school
2) Finished lower secondary
3) Finished upper secondary
4) Finished post-secondary education
5) Finished university or higher

Highest level of occupation of either parent (parents):

1) Has never worked outside home for pay, general laborer, or semi-professional (skilled agricultural or fishery worker, craft or trade worker, plant or machine operator)
2) Clerical (clerk or service or sales worker)
3) Small business owner
4) Professional (corporate manager or senior official, professional, or technician or associate professional)

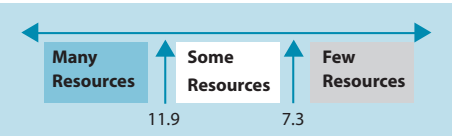


Exhibit 4.2: Components of the Home Resources for Learning Scale*

TIMSS 2011 4th Grade Mathematics

Columns 1-2 Reported by Students and Columns 3-5 Reported by Parents

Country	Percent of Students with				
	More than 100 Books in Their Home	Own Room and Internet Connection in Home	At Least One Parent with a University Degree or Higher	At Least One Parent in a Professional Occupation**	More than 25 Children's Books in Their Home
Armenia	29 (0.9)	30 (1.0)			
Australia	41 (1.0)	74 (1.0)	s 42 (1.5)	s 55 (1.6)	s 89 (1.0)
Austria	28 (1.3)	69 (1.0)	21 (1.1)	27 (1.0)	76 (1.8)
Azerbaijan	8 (0.7)	10 (0.6)	25 (1.1)	18 (0.9)	15 (1.1)
Bahrain	24 (1.0)	50 (1.5)			
Belgium (Flemish)	26 (1.1)	79 (0.9)			
Chile	15 (0.5)	46 (1.1)			
Chinese Taipei	30 (1.1)	52 (0.9)	23 (1.3)	35 (1.1)	59 (1.3)
Croatia	16 (0.8)	64 (1.2)	18 (1.0)	29 (1.2)	43 (1.1)
Czech Republic	34 (1.1)	58 (1.2)	23 (1.3)	36 (1.3)	79 (0.9)
Denmark	28 (1.2)	90 (0.8)			
England	34 (1.3)	75 (1.4)			
Finland	38 (1.4)	78 (1.0)	42 (1.4)	50 (1.2)	88 (0.7)
Georgia	35 (1.4)	34 (1.3)	36 (1.3)	31 (1.2)	38 (1.5)
Germany	35 (1.5)	71 (1.0)	r 28 (1.5)	r 30 (1.3)	r 81 (1.1)
Hong Kong SAR	25 (1.2)	56 (1.3)	18 (1.6)	29 (1.6)	52 (1.7)
Hungary	33 (1.5)	62 (1.4)	26 (1.6)	27 (1.4)	68 (1.4)
Iran, Islamic Rep. of	14 (0.8)	23 (1.4)	15 (1.4)	13 (1.1)	25 (1.2)
Ireland	33 (1.5)	71 (1.0)	33 (1.5)	43 (1.3)	78 (1.1)
Italy	23 (1.0)	38 (0.8)	20 (1.2)	26 (1.1)	54 (1.2)
Japan	22 (0.9)	57 (1.1)			
Kazakhstan	17 (1.3)	28 (1.6)			
Korea, Rep. of	65 (1.3)	54 (1.3)			
Kuwait	25 (1.1)	54 (1.5)			
Lithuania	16 (0.8)	48 (1.0)	30 (1.4)	29 (1.2)	46 (1.2)
Malta	24 (0.7)	67 (0.7)	r 18 (0.6)	r 32 (0.8)	87 (0.5)
Morocco	r 9 (0.6)	16 (0.9)	r 10 (0.9)	s 9 (0.8)	r 13 (0.8)
Netherlands	26 (1.3)	87 (0.9)			
New Zealand	38 (1.1)	69 (0.8)			
Northern Ireland	31 (1.4)	70 (1.1)	s 35 (1.7)	s 50 (1.7)	s 83 (1.2)
Norway	36 (1.4)	87 (0.8)	58 (2.0)	65 (1.6)	86 (1.2)
Oman	22 (0.9)	19 (0.7)	22 (0.7)	r 33 (0.8)	19 (0.6)
Poland	24 (0.9)	52 (1.1)	30 (1.4)	30 (1.3)	65 (1.0)
Portugal	21 (1.2)	64 (1.3)	25 (1.1)	33 (1.4)	63 (1.5)
Qatar	27 (0.9)	51 (1.1)	r 59 (1.5)	r 58 (1.6)	36 (1.1)
Romania	15 (1.0)	42 (1.5)	13 (1.1)	15 (1.2)	32 (1.4)
Russian Federation	25 (1.0)	40 (1.6)	46 (1.4)	41 (1.2)	65 (1.0)
Saudi Arabia	20 (1.2)	28 (1.5)	35 (1.5)	36 (1.4)	17 (1.0)
Serbia	16 (0.8)	57 (1.3)			
Singapore	31 (0.9)	49 (0.7)	33 (0.9)	56 (0.7)	72 (0.8)
Slovak Republic	26 (1.0)	47 (1.1)	26 (1.2)	31 (1.2)	58 (1.3)
Slovenia	27 (1.0)	67 (1.2)	23 (1.1)	40 (1.1)	69 (1.0)
Spain	29 (1.5)	65 (1.1)	33 (1.6)	33 (1.5)	69 (1.3)
Sweden	39 (1.4)	84 (0.8)	r 43 (1.7)	r 59 (1.5)	86 (0.8)
Thailand	8 (0.7)	11 (0.7)			
Tunisia	11 (0.7)	20 (1.1)			
Turkey	14 (0.8)	26 (1.1)			
United Arab Emirates	22 (0.6)	42 (0.8)	54 (0.8)	r 49 (0.9)	32 (0.8)
United States	28 (0.8)	64 (0.6)			
Yemen	9 (0.9)	7 (0.7)			
International Avg.	25 (0.2)	52 (0.2)	30 (0.2)	36 (0.2)	58 (0.2)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

* Data reported in columns 3-5 were from the PIRLS Home Questionnaire completed by parents, so data are available only for countries that administered both TIMSS and PIRLS to the same fourth grade students.

** Includes corporate manager or senior official, professional, and technician or associate professional.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

Exhibit 4.2: Components of the Home Resources for Learning Scale* (Continued)

TIMSS 2011 Mathematics 4th Grade

Country	Percent of Students with									
	More than 100 Books in Their Home		Own Room and Internet Connection in Home		At Least One Parent with a University Degree or Higher		At Least One Parent in a Professional Occupation**		More than 25 Children's Books in Their Home	
Sixth Grade Participants										
Botswana	10 (0.7)		11 (1.0)		10 (1.5)	s	22 (1.7)	s	14 (0.8)	
Honduras	6 (0.6)		17 (1.6)		10 (2.3)	s	13 (1.8)	s	11 (0.9)	
Yemen	8 (0.5)		6 (0.6)							
Benchmarking Participants										
Alberta, Canada	40 (1.3)		79 (1.1)							
Ontario, Canada	37 (1.3)		74 (1.2)							
Quebec, Canada	28 (1.2)		82 (1.0)		45 (2.0)		55 (1.5)		78 (1.2)	
Abu Dhabi, UAE	22 (1.1)		41 (1.5)		52 (1.7)		47 (1.8)		29 (1.7)	
Dubai, UAE	26 (0.6)		49 (0.9)		67 (0.9)		63 (0.8)	r	50 (0.6)	
Florida, US	21 (1.1)		66 (1.3)							
North Carolina, US	27 (1.6)		68 (1.7)							

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

students were from homes with more than 100 books in total, and more than half (52%) reported having both their own room and an Internet connection at home. Across the countries participating in both studies at the fourth grade, on average, 30 percent of the students had at least one parent that had earned a university degree and 36 percent had at least one parent in a professional occupation, and the majority of students (58%) had more than 25 children's books at home.

Exhibit 4.3 presents the results for the TIMSS 2011 eighth grade assessment for the Home Educational Resources scale, which was created based on students' reports about three of the five types of home resources that comprised the fourth grade Home Resources for Learning scale: number of books in the home, availability of two home study supports, and parents' education. The second page of the exhibit provides detail about the questions forming the scale and the categorization of responses. Students were scored according to the availability of the three home resources, with **Many Resources** corresponding to more than 100 books in the home, having their own room and an Internet connection, and at least one parent having completed university, on average. **Few Resources** corresponds, on average, to having 25 or fewer books, neither home study support, and neither parent having gone beyond upper secondary school.

Countries are ordered by the percentage of students in the **Many Resources** category, with the eighth grade countries on the first page of the exhibit and the ninth grade and benchmarking participants on the second page. Internationally, on average, two-thirds of the eighth-grade students (67%) were assigned to the **Some Resources** category. Twelve percent, on average, were in the **Many Resources** category and 21 percent internationally were in the **Few Resources** category, with a 115-point difference in their average mathematics achievement (530 vs. 415).

Exhibit 4.4 provides supporting detail about the availability of the specific home resources included in the Home Educational Resources scale for the eighth grade assessment. Across the countries participating at the eighth grade, on average, one-fourth of the students had more than 100 books in their home, more than half (53%) reported having both their own room and an Internet connection at home, and about one-third (32%) had at least one parent that had earned a university degree.

Students Spoke the Language of the Test

TIMSS has previously shown that, with some exceptions, countries with large proportions of students from homes where the language of the test (and consequently the language of instruction) is not often spoken had lower average mathematics achievement than students who spoke the language of the test more often. Because learning any school subject is dependent on having a mastery of the language of instruction, which in turn is influenced by children's early language experiences, the language or languages spoken at home and how they are used are important factors in subsequent school achievement. As formal mathematics instruction begins, children are likely to be at an initial disadvantage if their knowledge of the language of instruction is substantially below the expected level for their age.

Exhibit 4.5 shows parents' reports about whether students who participated in the fourth grade TIMSS 2011 assessment spoke the language of the test before starting school. For students in the fourth grade, 91 percent across countries, on average, spoke the language of the test before starting school. However, the 9 percent who did not speak the language of the test before starting school had lower average achievement on TIMSS 2011 (477 vs. 501). The results for the sixth grade and benchmarking students show that only about one-fourth (26%) of the students in Botswana spoke the language of the test before starting school, and that these students had higher achievement.

Exhibit 4.3: Home Educational Resources

TIMSS 2011 8th Grade Mathematics

Reported by Students

Students were scored according to their responses concerning the availability of three home educational resources on the *Home Educational Resources* scale. Students with **Many Resources** had a score of at least 12.5, which is the point on the scale corresponding to students reporting that they had more than 100 books in the home and two home study supports, and that at least one parent had finished university, on average. Students with **Few Resources** had a score no higher than 8.2, which is the scale point corresponding to students reporting that they had 25 or fewer books in the home, neither of the two home study supports, and that neither parent had gone beyond upper-secondary education, on average. All other students were assigned to the **Some Resources** category.

Country	Many Resources		Some Resources		Few Resources		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Korea, Rep. of	32 (1.4)	659 (3.1)	64 (1.3)	595 (2.5)	4 (0.3)	525 (7.8)	11.4 (0.06)
Norway	32 (1.2)	504 (2.8)	67 (1.1)	463 (2.3)	1 (0.2)	~ ~	11.6 (0.04)
Sweden	27 (1.0)	517 (2.6)	71 (1.0)	476 (1.8)	2 (0.2)	~ ~	11.3 (0.04)
United States	23 (0.8)	554 (3.8)	70 (0.8)	502 (2.3)	8 (0.4)	460 (5.0)	10.9 (0.04)
Finland	22 (1.0)	543 (2.9)	76 (1.0)	507 (2.4)	2 (0.2)	~ ~	11.2 (0.04)
Australia	22 (1.4)	558 (8.9)	75 (1.3)	494 (4.3)	4 (0.4)	430 (7.9)	11.2 (0.06)
Hungary	20 (1.0)	566 (3.2)	72 (1.0)	500 (2.9)	8 (0.9)	396 (8.3)	10.8 (0.06)
Armenia	20 (0.9)	502 (4.6)	72 (0.8)	463 (2.7)	8 (0.5)	416 (6.5)	10.8 (0.05)
New Zealand	19 (1.1)	539 (5.5)	76 (1.0)	483 (5.2)	5 (0.5)	414 (6.5)	10.9 (0.06)
Russian Federation	19 (0.9)	576 (4.1)	75 (0.9)	533 (3.5)	6 (0.6)	502 (8.5)	10.8 (0.05)
Georgia	17 (1.0)	494 (4.8)	71 (1.1)	428 (3.8)	12 (1.0)	365 (7.2)	10.5 (0.06)
Japan	17 (1.0)	608 (4.8)	78 (0.9)	565 (2.4)	5 (0.5)	492 (7.3)	10.8 (0.05)
England	17 (1.1)	564 (6.7)	79 (1.1)	500 (5.1)	5 (0.5)	427 (14.9)	10.8 (0.05)
Qatar	17 (0.9)	463 (7.0)	74 (1.1)	409 (3.0)	10 (0.7)	330 (7.9)	10.7 (0.04)
Israel r	16 (1.1)	579 (6.7)	82 (1.1)	517 (4.3)	2 (0.3)	~ ~	11.0 (0.05)
Slovenia	16 (0.8)	546 (3.7)	82 (0.8)	499 (2.0)	2 (0.3)	~ ~	10.9 (0.03)
Chinese Taipei	15 (0.6)	675 (5.5)	73 (0.8)	610 (3.1)	12 (0.7)	527 (5.3)	10.4 (0.04)
Italy	13 (0.8)	541 (3.3)	75 (1.0)	498 (2.2)	12 (0.8)	453 (5.8)	10.3 (0.04)
Ukraine	12 (0.9)	530 (6.0)	79 (1.0)	481 (3.5)	9 (0.9)	408 (9.6)	10.4 (0.05)
Singapore	12 (0.6)	658 (4.1)	76 (0.7)	612 (3.6)	12 (0.6)	560 (6.6)	10.3 (0.04)
United Arab Emirates	11 (0.5)	501 (4.5)	76 (0.6)	457 (1.9)	12 (0.5)	414 (3.5)	10.3 (0.03)
Lithuania	11 (0.9)	553 (5.2)	81 (1.0)	503 (2.4)	8 (0.6)	429 (5.5)	10.4 (0.04)
Romania	10 (0.8)	557 (5.9)	71 (1.3)	463 (3.5)	19 (1.2)	390 (5.8)	9.9 (0.06)
Hong Kong SAR	10 (0.8)	632 (9.0)	72 (1.0)	589 (3.5)	19 (0.8)	554 (6.5)	9.9 (0.05)
Bahrain	9 (0.5)	476 (7.1)	78 (0.9)	412 (2.2)	14 (0.7)	365 (5.4)	10.1 (0.03)
Kazakhstan	8 (0.9)	524 (11.5)	77 (1.1)	488 (3.7)	15 (1.2)	461 (7.9)	10.0 (0.07)
Macedonia, Rep. of	7 (0.8)	512 (10.0)	77 (1.0)	434 (4.7)	16 (1.0)	356 (7.5)	9.9 (0.06)
Iran, Islamic Rep. of	7 (0.7)	516 (11.7)	45 (1.6)	437 (4.6)	49 (1.8)	381 (3.4)	8.6 (0.09)
Chile	6 (0.5)	487 (6.6)	72 (1.1)	422 (2.5)	21 (1.2)	378 (4.0)	9.7 (0.05)
Saudi Arabia	6 (0.5)	428 (8.8)	61 (1.4)	403 (4.6)	32 (1.6)	370 (5.9)	9.4 (0.08)
Jordan	6 (0.5)	447 (6.5)	67 (1.0)	419 (3.4)	27 (1.0)	372 (4.4)	9.5 (0.05)
Lebanon	6 (0.5)	502 (8.3)	64 (1.5)	459 (4.0)	30 (1.6)	420 (3.8)	9.4 (0.07)
Oman	5 (0.3)	436 (5.3)	57 (0.9)	386 (2.9)	38 (1.0)	332 (3.3)	9.0 (0.04)
Turkey	5 (0.7)	602 (17.7)	41 (1.4)	484 (4.7)	54 (1.7)	417 (3.6)	8.4 (0.09)
Palestinian Nat'l Auth.	4 (0.4)	452 (7.9)	63 (1.1)	416 (3.6)	33 (1.2)	378 (4.6)	9.2 (0.05)
Malaysia	4 (0.4)	525 (9.6)	61 (1.3)	457 (5.0)	35 (1.5)	402 (5.8)	9.1 (0.07)
Tunisia	3 (0.4)	493 (8.9)	58 (1.3)	436 (3.3)	38 (1.4)	403 (2.7)	9.0 (0.07)
Syrian Arab Republic	3 (0.3)	408 (9.8)	52 (1.4)	387 (5.0)	45 (1.5)	371 (5.0)	8.7 (0.07)
Thailand	3 (0.5)	526 (15.9)	45 (1.3)	445 (5.4)	52 (1.5)	408 (4.1)	8.5 (0.06)
Morocco	3 (0.2)	455 (7.8)	38 (1.0)	392 (2.4)	59 (1.1)	357 (2.4)	8.0 (0.05)
Ghana	1 (0.2)	~ ~	37 (1.7)	336 (6.1)	62 (1.8)	329 (4.2)	7.9 (0.08)
Indonesia	1 (0.1)	~ ~	46 (1.9)	397 (5.0)	54 (2.0)	377 (4.5)	8.4 (0.06)
International Avg.	12 (0.1)	530 (1.2)	67 (0.2)	470 (0.6)	21 (0.2)	415 (1.0)	

Centerpoint of scale set at 10.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 4.3: Home Educational Resources (Continued)

Country	Many Resources		Some Resources		Few Resources		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Ninth Grade Participants							
Honduras	3 (0.4)	380 (11.6)	43 (1.4)	353 (5.2)	53 (1.6)	324 (3.5)	8.5 (0.07)
South Africa	3 (0.2)	487 (8.3)	55 (0.8)	362 (2.8)	42 (0.8)	333 (2.7)	8.7 (0.03)
Botswana	2 (0.2)	~ ~	49 (1.0)	402 (3.4)	50 (1.1)	393 (2.1)	8.4 (0.04)
Benchmarking Participants							
Massachusetts, US	35 (2.1)	592 (6.9)	61 (2.0)	548 (4.9)	4 (0.5)	489 (10.9)	11.5 (0.08)
Connecticut, US	32 (1.8)	569 (5.5)	64 (1.8)	501 (4.4)	4 (0.6)	429 (10.3)	11.4 (0.08)
Minnesota, US	32 (2.1)	579 (5.7)	65 (1.9)	532 (4.0)	3 (0.5)	473 (9.0)	11.5 (0.07)
Colorado, US	28 (1.7)	561 (5.2)	63 (1.7)	508 (4.7)	9 (0.9)	456 (5.8)	11.0 (0.08)
Alberta, Canada	27 (1.2)	527 (3.7)	71 (1.1)	498 (2.5)	1 (0.2)	~ ~	11.4 (0.04)
Ontario, Canada	26 (1.4)	541 (3.7)	73 (1.3)	501 (2.4)	1 (0.3)	~ ~	11.4 (0.06)
North Carolina, US	24 (1.9)	582 (9.8)	69 (1.8)	526 (5.8)	7 (0.8)	487 (7.0)	11.0 (0.08)
Indiana, US	21 (1.7)	563 (5.1)	74 (1.5)	514 (4.8)	5 (0.5)	465 (7.1)	10.9 (0.07)
Quebec, Canada	19 (0.8)	563 (3.5)	80 (0.8)	525 (2.3)	1 (0.2)	~ ~	11.1 (0.03)
Florida, US	17 (1.4)	563 (7.9)	76 (1.4)	508 (6.2)	8 (1.0)	478 (9.0)	10.7 (0.08)
Alabama, US	16 (2.0)	519 (9.8)	75 (1.9)	461 (5.1)	9 (0.8)	419 (5.6)	10.5 (0.10)
Dubai, UAE	15 (0.6)	529 (5.8)	76 (0.7)	475 (1.9)	9 (0.4)	417 (5.6)	10.6 (0.03)
California, US	15 (1.1)	548 (6.2)	70 (1.1)	490 (5.2)	15 (1.1)	453 (6.7)	10.3 (0.07)
Abu Dhabi, UAE	11 (0.9)	489 (9.5)	76 (1.0)	451 (3.6)	13 (0.8)	408 (4.9)	10.3 (0.05)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Number of books in the home:

1) 0-10
2) 11-25
3) 26-100
4) 101-200
5) More than 200

Number of home study supports:

1) None
2) Internet connection or own room
3) Both

Highest level of education of either parent:

1) Finished some primary or lower secondary or did not go to school
2) Finished lower secondary
3) Finished upper secondary
4) Finished post-secondary education
5) Finished university or higher

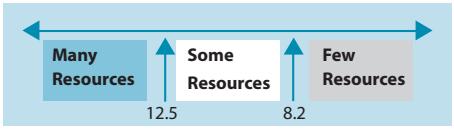


Exhibit 4.4: Components of the Home Educational Resources Scale

TIMSS 2011 8th Grade Mathematics

Reported by Students

Country	Percent of Students with		
	More than 100 Books in Their Home	Own Room and Internet Connection in Home	At Least One Parent with a University Degree or Higher
Armenia	32 (1.1)	47 (1.2)	59 (1.4)
Australia	42 (1.4)	86 (0.8)	31 (1.8)
Bahrain	19 (0.7)	61 (0.7)	33 (1.1)
Chile	15 (0.7)	53 (1.0)	21 (1.0)
Chinese Taipei	34 (0.8)	57 (0.7)	26 (0.9)
England	33 (1.5)	89 (0.8)	31 (1.8)
Finland	41 (1.1)	91 (0.5)	42 (1.2)
Georgia	37 (1.4)	43 (1.1)	33 (1.5)
Ghana	8 (0.7)	5 (0.5)	10 (0.7)
Hong Kong SAR	24 (1.1)	58 (0.9)	20 (1.4)
Hungary	41 (1.3)	79 (1.0)	26 (1.3)
Indonesia	4 (0.4)	14 (1.1)	12 (1.0)
Iran, Islamic Rep. of	15 (0.9)	24 (1.2)	15 (1.2)
Israel	38 (1.2)	– –	48 (1.2)
Italy	34 (0.9)	58 (1.0)	24 (1.1)
Japan	31 (1.2)	73 (1.1)	41 (1.4)
Jordan	16 (0.7)	26 (1.0)	35 (1.1)
Kazakhstan	17 (1.2)	37 (1.7)	36 (1.5)
Korea, Rep. of	56 (1.3)	70 (0.9)	49 (1.7)
Lebanon	16 (1.1)	39 (1.6)	25 (1.4)
Lithuania	24 (1.1)	67 (1.0)	24 (1.1)
Macedonia, Rep. of	13 (1.0)	71 (1.3)	29 (1.7)
Malaysia	10 (0.8)	31 (1.4)	15 (1.3)
Morocco	7 (0.4)	25 (0.9)	22 (0.8)
New Zealand	40 (1.5)	83 (0.9)	x x
Norway	45 (1.4)	96 (0.5)	62 (1.2)
Oman	21 (0.7)	22 (0.8)	24 (0.8)
Palestinian Nat'l Auth.	13 (0.8)	25 (1.0)	28 (1.1)
Qatar	25 (1.2)	67 (1.1)	65 (1.0)
Romania	19 (1.0)	61 (1.4)	20 (1.1)
Russian Federation	31 (1.0)	59 (1.3)	49 (1.5)
Saudi Arabia	14 (0.7)	40 (1.5)	37 (1.7)
Singapore	26 (0.8)	56 (0.7)	30 (0.9)
Slovenia	27 (0.9)	85 (0.8)	31 (1.1)
Sweden	42 (1.1)	94 (0.4)	47 (1.4)
Syrian Arab Republic	10 (0.6)	14 (0.9)	31 (1.3)
Thailand	7 (0.6)	23 (1.1)	17 (1.3)
Tunisia	9 (0.6)	33 (1.5)	19 (1.2)
Turkey	17 (1.1)	32 (1.5)	9 (1.0)
Ukraine	25 (1.1)	48 (1.9)	39 (1.3)
United Arab Emirates	21 (0.6)	55 (0.6)	52 (0.9)
United States	33 (0.9)	79 (0.5)	55 (1.0)
International Avg.	25 (0.2)	53 (0.2)	32 (0.2)

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (–) indicates comparable data not available.
An "x" indicates data are available for less than 50% of students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 4.4: Components of the Home Educational Resources Scale (Continued)

Country	Percent of Students with		
	More than 100 Books in Their Home	Own Room and Internet Connection in Home	At Least One Parent with a University Degree or Higher
Ninth Grade Participants			
Botswana	8 (0.5)	10 (0.6)	19 (0.9)
Honduras	8 (0.6)	24 (1.3)	15 (1.1)
South Africa	9 (0.4)	25 (0.7)	19 (0.7)
Benchmarking Participants			
Alberta, Canada	43 (1.2)	91 (0.8)	52 (1.7)
Ontario, Canada	41 (1.6)	86 (0.9)	51 (1.7)
Quebec, Canada	27 (0.9)	93 (0.6)	51 (1.3)
Abu Dhabi, UAE	21 (0.9)	55 (1.3)	52 (1.7)
Dubai, UAE	27 (1.0)	58 (0.8)	57 (1.1)
Alabama, US	23 (2.0)	79 (1.3)	51 (2.4)
California, US	25 (1.5)	67 (1.4)	40 (1.5)
Colorado, US	39 (1.7)	82 (1.6)	54 (2.0)
Connecticut, US	43 (1.6)	84 (1.0)	68 (2.6)
Florida, US	27 (1.6)	80 (1.3)	52 (2.2)
Indiana, US	32 (1.7)	82 (1.0)	53 (2.6)
Massachusetts, US	46 (2.0)	85 (0.8)	71 (2.1)
Minnesota, US	43 (2.1)	85 (0.9)	70 (1.6)
North Carolina, US	33 (2.0)	84 (1.0)	60 (2.2)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 4.5: Students Spoke the Language of the Test Before Starting School*

TIMSS 2011 4th Grade Mathematics

Reported by Parents

Country	Spoke the Language		Did Not Speak the Language	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Australia s	95 (0.6)	531 (3.2)	5 (0.6)	535 (14.7)
Austria	93 (0.6)	512 (2.7)	7 (0.6)	471 (4.7)
Azerbaijan	96 (0.9)	465 (5.7)	4 (0.9)	454 (14.5)
Chinese Taipei	97 (0.3)	593 (1.9)	3 (0.3)	558 (7.0)
Croatia	100 (0.1)	490 (1.9)	0 (0.1)	~ ~
Czech Republic	99 (0.3)	513 (2.3)	1 (0.3)	~ ~
Finland	99 (0.2)	547 (2.3)	1 (0.2)	~ ~
Georgia	98 (0.7)	453 (3.4)	2 (0.7)	~ ~
Germany r	97 (0.3)	534 (2.2)	3 (0.3)	494 (6.0)
Hong Kong SAR	97 (0.4)	607 (2.7)	3 (0.4)	600 (6.8)
Hungary	99 (0.2)	519 (3.4)	1 (0.2)	~ ~
Iran, Islamic Rep. of	80 (1.5)	443 (3.4)	20 (1.5)	383 (5.5)
Ireland	93 (0.6)	533 (2.8)	7 (0.6)	504 (6.6)
Italy	94 (0.5)	512 (2.5)	6 (0.5)	488 (6.8)
Lithuania	98 (0.6)	535 (2.6)	2 (0.6)	~ ~
Malta	44 (0.8)	514 (1.9)	56 (0.8)	490 (2.0)
Morocco	83 (1.9)	337 (4.7)	17 (1.9)	328 (6.6)
Northern Ireland s	98 (0.4)	579 (3.4)	2 (0.4)	~ ~
Norway	97 (0.4)	497 (2.8)	3 (0.4)	468 (7.9)
Oman	94 (0.3)	385 (3.2)	6 (0.3)	407 (4.8)
Poland	99 (0.1)	482 (2.2)	1 (0.1)	~ ~
Portugal	98 (0.3)	535 (3.2)	2 (0.3)	~ ~
Qatar r	73 (1.7)	414 (4.6)	27 (1.7)	460 (6.0)
Romania	97 (1.1)	483 (5.9)	3 (1.1)	456 (17.1)
Russian Federation	96 (1.0)	543 (3.6)	4 (1.0)	536 (13.3)
Saudi Arabia	74 (1.4)	415 (5.9)	26 (1.4)	400 (6.9)
Singapore	82 (0.5)	611 (3.2)	18 (0.5)	587 (4.4)
Slovak Republic	98 (0.6)	510 (3.4)	2 (0.6)	~ ~
Slovenia	97 (0.3)	516 (2.1)	3 (0.3)	462 (6.9)
Spain	87 (1.1)	488 (2.7)	13 (1.1)	472 (4.6)
Sweden r	95 (0.4)	509 (2.0)	5 (0.4)	474 (5.8)
United Arab Emirates	77 (0.8)	431 (2.1)	23 (0.8)	456 (3.2)
International Avg.	91 (0.1)	501 (0.6)	9 (0.1)	477 (1.8)
Sixth Grade Participants				
Botswana	26 (1.3)	450 (6.5)	74 (1.3)	414 (3.3)
Honduras	97 (0.5)	396 (5.6)	3 (0.5)	393 (15.3)
Benchmarking Participants				
Quebec, Canada	94 (0.8)	535 (2.6)	6 (0.8)	525 (5.1)
Abu Dhabi, UAE	81 (1.4)	412 (4.5)	19 (1.4)	448 (7.1)
Dubai, UAE	69 (0.7)	473 (2.3)	31 (0.7)	473 (2.4)

* Available only for countries that administered both TIMSS and PIRLS to the same fourth grade students because this item was included in the PIRLS Home Questionnaire completed by parents.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

In the TIMSS 2011 eighth grade assessment, students themselves reported on how often they speak the language of the test at home. As shown in Exhibit 4.6, for the eighth grade students, on average across countries, 79 percent always or almost always speak the language of the test at home, with 17 percent sometimes speaking it and 4 percent never speaking it. As with the fourth grade, mathematics achievement was higher for students who frequently speak the language of the test at home (469), compared to those who sometimes (443) or never (421) do so. Among the ninth grade participants, both Botswana and South Africa had very low percentages of students always or almost always speaking the language of the test at home (12% and 26%, respectively).

Exhibit 4.6: Students Speak the Language of the Test at Home

TIMSS 2011 8th Grade Mathematics

Reported by Students

Country	Always or Almost Always		Sometimes		Never	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Armenia	94 (0.5)	469 (2.7)	5 (0.4)	440 (6.5)	1 (0.1)	~ ~
Australia	93 (0.9)	504 (5.0)	6 (0.8)	516 (10.4)	1 (0.2)	~ ~
Bahrain	77 (0.7)	405 (2.2)	18 (0.6)	439 (4.2)	5 (0.5)	384 (9.3)
Chile	96 (0.3)	419 (2.6)	4 (0.3)	362 (7.8)	0 (0.1)	~ ~
Chinese Taipei	92 (0.7)	616 (3.0)	7 (0.6)	535 (7.7)	1 (0.2)	~ ~
England	95 (0.7)	508 (5.5)	4 (0.6)	491 (11.9)	1 (0.2)	~ ~
Finland	97 (0.4)	515 (2.5)	2 (0.3)	~ ~	1 (0.1)	~ ~
Georgia	95 (0.9)	436 (3.9)	4 (0.9)	359 (13.4)	0 (0.1)	~ ~
Ghana	26 (1.1)	332 (5.9)	70 (1.2)	334 (4.3)	4 (0.7)	292 (8.0)
Hong Kong SAR	79 (1.9)	578 (3.7)	17 (1.6)	619 (9.2)	3 (0.5)	601 (16.0)
Hungary	98 (0.3)	506 (3.4)	1 (0.3)	~ ~	0 (0.1)	~ ~
Indonesia	36 (2.9)	389 (7.7)	56 (2.4)	386 (4.1)	7 (0.9)	377 (8.3)
Iran, Islamic Rep. of	64 (2.2)	433 (4.9)	21 (1.5)	383 (6.5)	15 (1.3)	382 (4.8)
Israel	93 (0.9)	517 (3.9)	6 (0.7)	515 (11.9)	1 (0.2)	~ ~
Italy	89 (1.0)	504 (2.2)	9 (0.8)	449 (7.0)	2 (0.3)	~ ~
Japan	99 (0.2)	569 (2.7)	1 (0.2)	~ ~	0 (0.1)	~ ~
Jordan	88 (0.8)	409 (3.6)	9 (0.6)	400 (6.9)	3 (0.4)	363 (13.0)
Kazakhstan	92 (0.8)	488 (4.1)	8 (0.8)	475 (6.1)	1 (0.2)	~ ~
Korea, Rep. of	100 (0.1)	613 (2.9)	0 (0.1)	~ ~	0 (0.1)	~ ~
Lebanon	20 (1.3)	466 (6.2)	64 (1.4)	446 (4.1)	16 (0.7)	442 (5.0)
Lithuania	96 (0.8)	504 (2.4)	3 (0.7)	460 (20.2)	1 (0.2)	~ ~
Macedonia, Rep. of	91 (1.0)	431 (5.2)	6 (0.7)	385 (10.9)	2 (0.5)	~ ~
Malaysia	62 (2.0)	425 (5.9)	25 (1.3)	463 (7.4)	13 (1.1)	469 (9.7)
Morocco	63 (1.2)	369 (2.4)	29 (0.9)	376 (2.3)	8 (0.6)	381 (6.3)
New Zealand	92 (0.9)	489 (5.1)	7 (0.7)	489 (11.5)	1 (0.2)	~ ~
Norway	94 (0.7)	477 (2.4)	5 (0.6)	449 (5.9)	1 (0.2)	~ ~
Oman	65 (1.3)	369 (3.2)	28 (1.1)	369 (3.6)	7 (0.5)	349 (7.4)
Palestinian Nat'l Auth.	93 (1.1)	405 (3.5)	5 (0.7)	395 (7.6)	2 (0.6)	~ ~
Qatar	65 (0.9)	401 (4.1)	29 (0.8)	437 (4.0)	6 (0.5)	375 (10.5)
Romania	98 (0.3)	460 (4.0)	1 (0.3)	~ ~	0 (0.1)	~ ~
Russian Federation	92 (1.9)	540 (3.7)	7 (1.7)	533 (9.4)	1 (0.3)	~ ~
Saudi Arabia	75 (2.0)	399 (4.8)	16 (1.2)	381 (8.4)	9 (1.1)	378 (7.6)
Singapore	57 (0.9)	622 (3.3)	38 (0.8)	597 (4.8)	5 (0.3)	592 (8.4)
Slovenia	88 (1.7)	510 (2.2)	8 (1.0)	463 (6.4)	4 (1.0)	483 (7.8)
Sweden	92 (0.6)	487 (1.9)	6 (0.5)	454 (5.2)	1 (0.2)	~ ~
Syrian Arab Republic	85 (1.5)	383 (4.3)	11 (1.0)	362 (8.7)	4 (0.8)	378 (25.0)
Thailand	66 (2.3)	441 (4.9)	30 (2.1)	402 (5.6)	3 (0.5)	388 (10.7)
Tunisia	19 (0.7)	412 (3.1)	56 (1.1)	427 (2.9)	25 (0.9)	429 (4.4)
Turkey	90 (1.2)	461 (4.3)	8 (1.0)	383 (7.2)	2 (0.3)	~ ~
Ukraine	61 (2.7)	478 (4.9)	27 (1.8)	481 (5.0)	12 (1.4)	484 (6.2)
United Arab Emirates	67 (1.2)	453 (2.0)	27 (0.9)	467 (3.2)	5 (0.4)	445 (5.3)
United States	91 (0.4)	513 (2.7)	8 (0.4)	487 (4.8)	1 (0.1)	~ ~
International Avg.	79 (0.2)	469 (0.6)	17 (0.2)	443 (1.3)	4 (0.1)	421 (2.4)

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A tilde (~) indicates insufficient data to report achievement.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 4.6: Students Speak the Language of the Test at Home (Continued)

Country	Always or Almost Always		Sometimes		Never	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Ninth Grade Participants						
Botswana	12 (0.6)	414 (7.4)	82 (0.7)	397 (2.1)	7 (0.4)	367 (3.9)
Honduras	95 (0.4)	340 (3.7)	4 (0.4)	299 (13.0)	1 (0.1)	~ ~
South Africa	26 (1.0)	405 (4.5)	65 (1.2)	337 (2.2)	9 (0.6)	312 (4.9)
Benchmarking Participants						
Alberta, Canada	86 (1.6)	504 (2.6)	11 (1.2)	514 (5.1)	3 (0.7)	518 (6.7)
Ontario, Canada	89 (0.9)	509 (2.6)	10 (0.8)	525 (6.5)	1 (0.2)	~ ~
Quebec, Canada	89 (1.1)	532 (2.4)	8 (0.8)	522 (4.9)	3 (0.4)	552 (9.1)
Abu Dhabi, UAE	69 (1.8)	445 (3.9)	25 (1.4)	463 (6.1)	6 (0.7)	437 (8.1)
Dubai, UAE	62 (1.4)	479 (2.5)	34 (1.3)	477 (3.7)	4 (0.5)	467 (8.1)
Alabama, US	97 (0.5)	467 (6.0)	3 (0.5)	457 (12.5)	1 (0.2)	~ ~
California, US	81 (1.4)	498 (4.7)	18 (1.3)	477 (7.9)	2 (0.3)	~ ~
Colorado, US	88 (1.1)	524 (4.8)	11 (1.2)	475 (7.8)	1 (0.3)	~ ~
Connecticut, US	91 (0.7)	524 (4.7)	8 (0.6)	484 (7.4)	1 (0.2)	~ ~
Florida, US	88 (1.3)	515 (6.5)	11 (1.2)	517 (10.9)	1 (0.3)	~ ~
Indiana, US	96 (0.5)	524 (5.4)	3 (0.4)	480 (10.0)	1 (0.2)	~ ~
Massachusetts, US	91 (1.0)	564 (5.2)	8 (0.9)	525 (14.0)	1 (0.3)	~ ~
Minnesota, US	96 (0.8)	548 (4.5)	4 (0.8)	497 (9.1)	0 (0.2)	~ ~
North Carolina, US	95 (0.7)	539 (6.9)	5 (0.7)	513 (11.2)	0 (0.1)	~ ~

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Parents' Educational Expectations for Their Children

Studies over the past several years have found a positive relationship between parental aspirations for their children and academic achievement. For example, researchers studying longitudinal effects in the United States found that more communication between parents and students and higher parents' aspirations resulted in higher student achievement (Hong & Ho, 2005). Across four ethnic groups, parents' educational aspiration was the most powerful predictor in increasing student educational aspiration; ultimately, the greater the student's own educational expectations, the greater the student's academic achievement.

Exhibit 4.7 presents parents' reports about their educational expectations for their children according to four education levels from highest to lowest: postgraduate degree, university degree, post-secondary, and upper secondary (or lower). Results are shown for countries that administered both TIMSS and PIRLS fourth grade assessments to the same fourth grade students. Across the TIMSS 2011 participants, parents have very high educational expectations for their children (to the extent that some parents may have misunderstood the question). Nearly one-third (30%) of the fourth grade students have parents who expect them to attain a postgraduate degree and another third (35%) are expected to graduate from university. Still, there was considerable variation in results across and within countries.

Consistent with other research, the results show a positive relationship between parents' aspirations and students' average mathematics achievement. Across the fourth grade countries, students had higher average mathematics achievement with each higher education level of expectation, to the extent that there was a 79-point difference between students whose parents expected a postgraduate degree at one end of the continuum and those expecting upper secondary school (or lower) at the other end of the continuum (528 vs. 449). The results for the sixth grade and benchmarking participants mirror the results at the fourth grade.

Exhibit 4.8 presents students' reports of their educational aspirations from the TIMSS 2011 eighth grade assessment. As shown on the first page and similar to the parents of the fourth grade students, eighth grade students had high expectations for further education, such that some students also may have misunderstood the question. However, looking at the countries that administered TIMSS and PIRLS to the same students at the fourth grade and also participated at the eighth grade, there was some degree of correspondence between the parents' responses and those by eighth grade students Almost

Exhibit 4.7: Parents' Educational Expectations for Their Children*

Reported by Parents

Country		Parents Expect Their Child to Complete							
		Postgraduate Degree**		University but Not Postgraduate Degree		Post-secondary but Not University		Upper Secondary Education or Less	
		Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Iran, Islamic Rep. of		75 (0.9)	445 (3.8)	12 (0.5)	417 (5.5)	10 (0.6)	381 (5.8)	3 (0.4)	344 (9.0)
United Arab Emirates		59 (0.7)	457 (2.3)	31 (0.6)	419 (2.6)	6 (0.3)	409 (5.0)	5 (0.3)	368 (6.0)
Qatar		58 (1.0)	441 (4.1)	33 (1.1)	395 (5.0)	3 (0.3)	351 (11.1)	6 (0.4)	351 (9.7)
Poland		52 (1.2)	504 (2.5)	25 (0.9)	482 (2.6)	6 (0.5)	454 (3.9)	18 (0.9)	424 (3.8)
Saudi Arabia		49 (1.8)	428 (6.6)	32 (1.3)	403 (6.2)	8 (0.8)	379 (7.4)	11 (1.0)	382 (11.8)
Slovak Republic		48 (1.4)	544 (2.8)	6 (0.4)	513 (4.8)	13 (0.5)	499 (3.9)	33 (1.4)	463 (4.8)
Portugal		48 (1.0)	552 (2.9)	36 (0.9)	530 (3.6)	6 (0.6)	493 (7.0)	10 (0.7)	493 (6.9)
Oman		43 (0.7)	413 (3.5)	40 (0.7)	383 (3.1)	6 (0.3)	352 (6.3)	12 (0.5)	323 (5.3)
Morocco	r	42 (1.4)	359 (4.5)	21 (0.9)	333 (5.1)	0 (0.0)	~ ~	37 (1.5)	323 (8.5)
Chinese Taipei		42 (1.0)	615 (2.0)	44 (0.7)	586 (2.3)	9 (0.5)	562 (5.1)	5 (0.5)	506 (7.0)
Singapore		34 (0.8)	625 (3.5)	47 (0.8)	618 (3.0)	18 (0.8)	556 (3.5)	2 (0.2)	~ ~
Georgia		32 (1.4)	496 (3.7)	20 (1.0)	459 (5.7)	24 (1.2)	431 (5.6)	24 (1.2)	405 (6.5)
Spain		28 (1.1)	503 (3.3)	52 (1.2)	494 (2.8)	7 (0.5)	459 (5.2)	12 (0.8)	437 (4.5)
Ireland		27 (1.0)	552 (3.6)	42 (1.1)	544 (3.2)	26 (1.3)	504 (3.0)	5 (0.4)	473 (7.7)
Azerbaijan		27 (1.2)	482 (5.5)	40 (1.3)	471 (7.1)	15 (1.1)	443 (8.6)	18 (1.2)	445 (8.4)
Hong Kong SAR		26 (1.1)	620 (3.2)	62 (0.9)	609 (2.8)	6 (0.5)	579 (4.4)	6 (0.5)	569 (5.6)
Finland		26 (1.3)	576 (3.2)	29 (0.8)	554 (2.5)	12 (0.7)	540 (4.3)	33 (1.2)	521 (3.3)
Lithuania		23 (1.0)	579 (3.4)	32 (1.0)	551 (2.7)	34 (1.0)	511 (2.7)	11 (0.7)	464 (5.9)
Czech Republic		22 (1.0)	552 (3.6)	14 (0.7)	540 (3.4)	6 (0.5)	526 (5.1)	58 (1.3)	491 (2.3)
Romania		21 (1.3)	536 (4.4)	29 (1.5)	516 (4.6)	16 (1.0)	480 (6.5)	34 (2.1)	421 (11.2)
Germany	r	20 (1.1)	575 (2.8)	9 (0.5)	555 (3.6)	16 (0.8)	519 (2.9)	55 (1.3)	519 (2.6)
Northern Ireland	s	18 (1.1)	621 (4.4)	37 (1.4)	606 (3.6)	13 (0.8)	564 (5.8)	32 (1.5)	533 (5.6)
Australia	s	18 (1.1)	564 (7.4)	42 (1.5)	556 (3.8)	25 (1.2)	502 (4.0)	15 (0.9)	485 (5.9)
Hungary		16 (1.2)	592 (3.4)	30 (1.0)	554 (2.4)	24 (0.8)	510 (3.1)	30 (1.3)	451 (5.6)
Italy		15 (0.7)	517 (4.5)	49 (0.9)	525 (2.7)	12 (0.6)	487 (5.2)	24 (0.9)	492 (3.8)
Malta		13 (0.6)	541 (3.8)	25 (0.6)	531 (2.8)	29 (0.8)	508 (2.7)	33 (0.8)	457 (2.8)
Croatia		9 (0.4)	518 (4.6)	34 (1.1)	516 (2.2)	48 (1.0)	478 (2.0)	9 (0.6)	436 (4.1)
Slovenia		7 (0.5)	551 (4.9)	42 (1.1)	538 (2.5)	36 (0.9)	500 (2.5)	14 (0.8)	464 (3.8)
Norway		5 (0.5)	493 (7.5)	64 (1.6)	508 (3.1)	26 (1.4)	479 (3.3)	5 (0.6)	470 (7.9)
Russian Federation		3 (0.3)	586 (9.8)	69 (1.2)	556 (3.5)	23 (1.0)	508 (4.5)	6 (0.6)	505 (9.0)
Austria		– –	– –	– –	– –	– –	– –	– –	– –
Sweden		– –	– –	– –	– –	– –	– –	– –	– –
International Avg.		30 (0.2)	528 (0.8)	35 (0.2)	509 (0.7)	16 (0.1)	482 (1.0)	19 (0.2)	449 (1.2)
Sixth Grade Participants									
Botswana	r	52 (1.9)	442 (5.4)	15 (0.8)	429 (6.6)	19 (1.1)	404 (5.3)	14 (1.0)	388 (4.9)
Honduras	r	36 (1.8)	428 (7.5)	22 (1.3)	409 (6.2)	14 (0.9)	391 (7.0)	28 (1.6)	360 (5.6)
Benchmarking Participants									
Dubai, UAE		66 (0.8)	489 (2.3)	25 (0.8)	456 (3.5)	6 (0.5)	440 (7.6)	3 (0.3)	384 (5.9)
Abu Dhabi, UAE		59 (1.3)	441 (4.6)	32 (1.0)	398 (5.3)	5 (0.5)	380 (7.3)	5 (0.5)	351 (11.1)
Quebec, Canada		18 (1.4)	550 (4.4)	43 (1.3)	547 (2.4)	33 (1.5)	518 (2.9)	6 (0.7)	501 (6.6)

* Available only for countries that administered both TIMSS and PIRLS to the same fourth grade students because this item was included in the PIRLS Home Questionnaire completed by parents.

** For example, doctorate, master's, or other postgraduate degree or diploma.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A dash (–) indicates comparable data not available. A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 4.8: Students' Educational Expectations

TIMSS 2011 8th Grade Mathematics

Reported by Students

Country	Postgraduate Degree*		University but Not Postgraduate Degree		Post-secondary but Not University		Upper Secondary Education or Less		Do Not Know	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Saudi Arabia	62 (1.3)	413 (4.7)	14 (0.7)	388 (6.1)	0 (0.0)	~ ~	10 (0.8)	325 (7.3)	15 (0.9)	362 (7.3)
Qatar	54 (1.0)	441 (3.7)	25 (0.9)	403 (4.9)	4 (0.4)	346 (9.4)	8 (0.5)	302 (7.0)	9 (0.6)	367 (10.6)
Iran, Islamic Rep. of	53 (1.0)	443 (5.5)	15 (0.6)	404 (3.5)	6 (0.3)	363 (5.6)	5 (0.4)	331 (7.9)	20 (0.7)	387 (4.2)
Israel	51 (1.2)	548 (4.0)	19 (0.8)	536 (3.8)	10 (0.6)	463 (6.3)	10 (0.8)	429 (7.1)	10 (0.5)	492 (7.4)
Palestinian Nat'l Auth.	49 (0.9)	436 (4.0)	11 (0.7)	421 (5.6)	6 (0.4)	381 (5.4)	12 (0.8)	338 (6.5)	22 (1.1)	374 (5.1)
Tunisia	49 (1.0)	448 (3.5)	5 (0.4)	442 (6.5)	13 (0.6)	396 (3.7)	7 (0.4)	377 (4.7)	27 (0.9)	406 (3.2)
United Arab Emirates	48 (0.7)	484 (2.3)	21 (0.5)	459 (2.8)	9 (0.3)	439 (3.1)	7 (0.3)	368 (3.5)	14 (0.5)	424 (3.0)
Oman	45 (0.8)	409 (2.9)	17 (0.5)	374 (3.6)	5 (0.3)	326 (7.6)	11 (0.5)	293 (4.9)	23 (0.7)	336 (4.1)
Jordan	45 (0.9)	445 (3.2)	19 (0.7)	410 (3.8)	6 (0.4)	360 (6.5)	9 (0.6)	320 (8.0)	21 (0.8)	388 (4.9)
Lebanon	42 (1.4)	476 (4.6)	29 (1.1)	452 (3.6)	8 (0.6)	401 (5.1)	6 (0.6)	397 (6.9)	15 (0.9)	427 (4.5)
Indonesia	42 (1.6)	403 (5.1)	19 (0.9)	392 (4.8)	7 (0.5)	375 (7.6)	13 (0.9)	361 (6.1)	20 (1.2)	366 (5.0)
United States	40 (0.7)	533 (3.2)	43 (0.5)	505 (2.3)	4 (0.2)	473 (4.6)	6 (0.3)	449 (4.9)	7 (0.3)	493 (4.1)
Bahrain	39 (0.9)	451 (2.5)	16 (0.6)	415 (4.1)	9 (0.5)	395 (4.4)	15 (0.5)	320 (6.3)	21 (0.8)	399 (5.3)
Morocco	37 (0.8)	406 (2.7)	16 (0.6)	366 (4.2)	0 (0.0)	~ ~	16 (0.7)	334 (3.2)	30 (1.0)	363 (2.5)
Singapore	33 (0.7)	639 (3.2)	36 (0.8)	621 (3.1)	18 (0.9)	553 (5.3)	1 (0.1)	~ ~	12 (0.5)	600 (6.3)
Macedonia, Rep. of	33 (1.3)	474 (5.8)	43 (1.1)	434 (5.1)	3 (0.3)	383 (11.7)	13 (0.8)	357 (7.0)	8 (0.6)	370 (12.1)
Hong Kong SAR	32 (1.2)	617 (4.3)	40 (1.1)	594 (3.5)	11 (0.7)	542 (5.3)	8 (0.8)	504 (7.6)	10 (0.5)	569 (7.1)
Armenia	29 (1.1)	508 (3.7)	8 (0.5)	484 (4.9)	13 (0.6)	453 (5.8)	22 (0.9)	416 (4.6)	29 (0.8)	468 (3.2)
Malaysia	28 (1.6)	472 (5.7)	20 (1.0)	455 (5.0)	24 (1.1)	423 (5.3)	10 (1.1)	377 (11.5)	17 (1.0)	432 (6.9)
Turkey	28 (1.1)	532 (6.7)	44 (0.9)	456 (3.3)	5 (0.3)	411 (7.0)	16 (0.8)	354 (4.1)	7 (0.4)	391 (7.3)
Chinese Taipei	27 (1.0)	674 (4.2)	46 (0.8)	611 (2.9)	5 (0.3)	573 (6.2)	12 (0.7)	492 (4.7)	10 (0.5)	592 (6.2)
Ghana	27 (1.7)	377 (5.9)	42 (1.4)	332 (3.7)	18 (1.0)	298 (6.6)	8 (0.6)	274 (6.1)	5 (0.6)	331 (15.2)
Thailand	25 (1.4)	469 (6.7)	32 (1.0)	441 (4.0)	7 (0.5)	401 (5.9)	22 (1.0)	388 (5.1)	13 (0.8)	402 (4.6)
Syrian Arab Republic	25 (1.0)	412 (5.0)	34 (1.2)	386 (4.7)	4 (0.3)	353 (7.9)	14 (1.2)	346 (7.2)	22 (0.9)	365 (6.6)
Hungary	22 (1.0)	572 (3.4)	20 (0.8)	537 (3.1)	23 (0.9)	490 (3.9)	26 (1.1)	434 (4.8)	8 (0.5)	511 (5.7)
Italy	22 (1.0)	524 (3.6)	28 (0.9)	527 (2.5)	12 (0.6)	482 (3.8)	31 (1.1)	467 (3.4)	8 (0.5)	489 (5.6)
England	20 (1.4)	554 (6.3)	17 (1.1)	545 (6.5)	25 (1.1)	490 (5.3)	21 (1.2)	461 (5.5)	16 (0.8)	497 (7.3)
Kazakhstan	20 (0.9)	500 (5.7)	40 (1.1)	499 (4.3)	15 (0.7)	473 (4.7)	18 (0.9)	465 (5.4)	7 (0.5)	482 (7.3)
Georgia	20 (1.2)	507 (5.2)	7 (0.7)	475 (6.8)	22 (1.1)	442 (4.9)	36 (1.2)	382 (4.6)	15 (0.9)	427 (6.9)
New Zealand	20 (0.9)	526 (6.2)	13 (0.7)	525 (7.4)	20 (0.6)	489 (4.5)	21 (1.0)	444 (5.1)	26 (0.9)	486 (5.6)
Australia	20 (1.2)	561 (8.2)	14 (0.7)	543 (6.7)	30 (1.0)	487 (4.0)	22 (1.1)	454 (4.6)	15 (0.7)	524 (6.7)
Lithuania	19 (0.8)	549 (3.8)	17 (0.8)	540 (3.0)	32 (0.9)	492 (3.0)	14 (0.7)	441 (4.2)	18 (0.7)	489 (4.6)
Korea, Rep. of	18 (0.6)	646 (5.1)	55 (0.7)	627 (2.7)	11 (0.5)	567 (4.7)	4 (0.3)	498 (6.2)	11 (0.6)	574 (4.8)
Romania	17 (0.9)	527 (5.3)	28 (1.0)	501 (4.3)	15 (0.6)	451 (5.1)	29 (1.3)	398 (5.3)	10 (0.6)	423 (8.0)
Chile	17 (0.8)	473 (4.1)	52 (1.0)	426 (2.4)	18 (0.7)	383 (3.8)	10 (0.6)	365 (4.5)	4 (0.3)	401 (8.4)
Slovenia	15 (0.8)	546 (3.4)	20 (0.8)	544 (3.0)	46 (1.0)	486 (2.6)	8 (0.5)	447 (4.9)	12 (0.6)	502 (4.4)
Finland	12 (0.7)	555 (3.6)	10 (0.5)	534 (3.7)	8 (0.4)	510 (4.8)	41 (1.2)	494 (2.3)	29 (1.0)	523 (3.1)
Norway	9 (0.6)	494 (5.8)	39 (1.0)	492 (3.1)	22 (0.7)	465 (2.9)	7 (0.5)	433 (5.9)	23 (0.9)	468 (3.4)
Russian Federation	6 (0.5)	583 (5.1)	53 (1.1)	561 (3.4)	18 (0.8)	507 (4.7)	15 (0.9)	500 (6.0)	7 (0.4)	514 (4.7)
Ukraine	4 (0.5)	538 (9.6)	30 (1.2)	518 (4.1)	21 (0.9)	467 (4.3)	38 (1.5)	455 (5.7)	6 (0.6)	468 (6.6)
Japan	2 (0.2)	~ ~	46 (1.0)	602 (3.3)	20 (0.7)	549 (3.4)	20 (0.8)	511 (3.4)	12 (0.6)	557 (4.3)
Sweden	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –
International Avg.	29 (0.2)	504 (0.8)	27 (0.1)	482 (0.7)	14 (0.1)	445 (0.9)	15 (0.1)	402 (0.9)	15 (0.1)	450 (1.0)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

* For example, doctorate, master's, or other postgraduate degree or diploma.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A dash (–) indicates comparable data not available. A tilde (~) indicates insufficient data to report achievement.

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Exhibit 4.8: Students' Educational Expectations (Continued)

Country	Postgraduate Degree*		University but Not Postgraduate Degree		Post-secondary but Not University		Upper Secondary Education or Less		Do Not Know	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Ninth Grade Participants										
South Africa	45 (1.0)	398 (2.9)	9 (0.4)	374 (5.0)	15 (0.4)	332 (3.3)	25 (0.7)	309 (2.8)	6 (0.6)	313 (6.0)
Honduras	29 (1.3)	362 (6.5)	35 (0.8)	336 (3.4)	21 (1.0)	333 (4.0)	6 (0.5)	288 (6.3)	9 (0.7)	330 (6.5)
Botswana	27 (1.0)	449 (3.3)	19 (0.7)	410 (2.6)	28 (0.8)	384 (3.0)	20 (0.9)	349 (3.4)	4 (0.3)	378 (7.0)
Benchmarking Participants										
Dubai, UAE	51 (1.2)	501 (2.6)	19 (0.7)	479 (3.6)	12 (0.6)	455 (3.9)	5 (0.3)	367 (7.3)	13 (0.6)	459 (3.7)
Abu Dhabi, UAE	50 (1.1)	476 (4.1)	20 (0.8)	448 (5.5)	8 (0.6)	431 (5.9)	7 (0.5)	368 (5.8)	15 (0.7)	415 (5.5)
North Carolina, US	46 (1.9)	557 (7.5)	42 (1.5)	529 (5.6)	2 (0.5)	~ ~	4 (0.5)	462 (11.6)	6 (0.5)	520 (19.7)
Florida, US	46 (2.1)	535 (7.7)	39 (1.3)	507 (5.2)	3 (0.5)	472 (10.9)	6 (1.2)	467 (8.9)	7 (0.6)	494 (9.8)
Alberta, Canada	42 (1.1)	523 (3.1)	22 (0.8)	505 (3.2)	17 (0.8)	477 (2.7)	4 (0.5)	478 (8.0)	14 (0.6)	498 (4.4)
Massachusetts, US	42 (1.6)	583 (6.1)	43 (1.5)	552 (4.9)	3 (0.3)	516 (8.7)	3 (0.4)	489 (9.7)	9 (0.8)	545 (9.1)
Ontario, Canada	41 (1.3)	536 (2.9)	23 (0.8)	515 (3.0)	21 (1.0)	471 (3.8)	2 (0.3)	~ ~	14 (0.6)	498 (4.4)
Connecticut, US	41 (1.8)	544 (5.4)	41 (1.4)	515 (5.0)	3 (0.3)	471 (12.3)	5 (0.6)	436 (8.3)	9 (0.9)	508 (7.3)
Alabama, US	41 (1.8)	489 (7.7)	40 (1.3)	464 (5.1)	4 (0.5)	424 (9.5)	8 (1.0)	401 (6.3)	7 (0.6)	457 (7.3)
Colorado, US	41 (1.4)	541 (5.4)	43 (1.5)	514 (4.7)	3 (0.4)	473 (12.9)	6 (0.6)	450 (6.4)	7 (0.8)	493 (9.2)
Indiana, US	40 (1.8)	544 (5.4)	44 (1.2)	518 (4.7)	4 (0.5)	473 (10.0)	5 (0.6)	454 (7.5)	7 (0.5)	502 (9.4)
California, US	39 (1.6)	517 (5.6)	41 (1.2)	489 (4.7)	4 (0.5)	467 (13.1)	7 (0.8)	445 (10.2)	8 (0.4)	469 (8.6)
Minnesota, US	37 (1.3)	567 (4.6)	48 (1.2)	542 (5.0)	3 (0.4)	506 (8.8)	4 (0.6)	467 (12.5)	8 (0.7)	518 (5.0)
Quebec, Canada	34 (1.2)	553 (2.6)	26 (0.8)	541 (2.9)	23 (0.9)	502 (2.7)	4 (0.4)	480 (5.9)	13 (0.7)	529 (3.1)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

one-third (29%) of the eighth grade students expect to attain a postgraduate degree and more than one-fourth (27%) expect to graduate from university. Fifteen percent of the eighth grade students indicated that they did not know how far in school they would go.

The eighth grade results also show a positive relationship between educational aspirations (in this case those of the students themselves) and average mathematics achievement. Across the eighth grade countries, the students at each higher education level of expectation had higher average mathematics achievement than the level below. Students expecting a postgraduate degree had a 102-point advantage in average achievement compared to those expecting to go no further than upper secondary school, a full standard deviation on the TIMSS achievement scale (504 vs. 402). The results for the ninth grade and benchmarking participants were similar to the results at the eighth grade.

Children Were Engaged In Numeracy Activities Before Beginning Primary School

There is increasing evidence that participating in numeracy and literacy activities during the preschool years can have beneficial effects on children's later acquisition of numeracy and literacy skills. For example, a large study in England recently found that a composite variable of seven home activities—being read to, going to the library, playing with numbers, painting and drawing, being taught letters, being taught numbers, and songs/poems/rhymes—had greater predictive power for literacy and numeracy achievement than any other variables studied, including socio-economic status, parents' education, and household income (Melhuish et al., 2008).

To examine children's early numeracy experiences and as an accompaniment to the PIRLS Early Literacy Activities scale, TIMSS 2011 has included an Early Numeracy Activities scale in the fourth grade assessment for the first time. As with the other scales developed for TIMSS 2011, IRT was used to summarize the results.

Exhibit 4.9 presents the results for the TIMSS 2011 Early Numeracy Activities scale for countries that administered both TIMSS and PIRLS to the same fourth grade students. Students were scored according their parents' frequency of doing six activities with them: saying counting rhymes or singing counting songs, playing with number toys, counting different things, playing games involving shapes, playing with building blocks or construction toys, and playing board games or card games. Students **Often** engaged in early numeracy

activities had parents who reported "often" doing three of the six activities with them and "sometimes" doing the other three, on average. Students **Never or Almost Never** engaged in such activities had parents "never or almost never" doing three of the six activities with them and "sometimes" doing the other three, on average.

Internationally, across the countries at the fourth grade, 49 percent of the students had parents that **Often** engaged them in early numeracy activities, and an additional 45 percent had parents that **Sometimes** engaged them in early numeracy activities. The fourth grade students whose parents **Often** engaged them had higher average achievement than the students whose parents only **Sometimes** engaged them in numeracy activities (510 vs. 493). In several countries, a small percentage of students had parents who rarely did any of the numeracy activities with them, and these students typically had low average mathematics achievement. The countries that participated at the sixth grade had relatively high percentages of students with parents who **Never or Almost Never** engaged them in early numeracy activities, comparable to the country with the highest percentage at fourth grade.

Students Attended Preprimary Education

Preprimary education, in the form of preschool, kindergarten, or an early childhood education program, plays an important role in preparing children for primary school. For example, PIRLS 2006 found a positive relationship between years of preprimary education and reading achievement in the fourth grade. Also, recent analyses of longitudinal data in the United States and England found that preschool attendance was positively related to enhanced school performance, and that the duration of attendance was associated with greater academic improvement (Tucker-Drob, 2012; Sammons et al., 2002). Besides giving students an early start in school and life, there are also broader reasons for countries to invest in preschool (Economist Intelligence Unit, 2012). For example, preprimary education provides an avenue for overcoming children's disadvantages and can help to break the generational repetitive cycle of poverty and low achievement.

Although there is considerable variation across countries, according to the *TIMSS 2011 Encyclopedia*, some countries already have mandatory preprimary education (e.g., Austria, Hungary, and the Netherlands), some have nearly 100 percent enrollment even though attendance is not mandatory (e.g., Australia, Croatia, and Singapore), and a number of the remaining countries are working

Exhibit 4.9: Early Numeracy Activities Before Beginning Primary School*

TIMSS 2011 4th Grade Mathematics

Reported by Parents

Students were scored according to their parents' frequency of doing the six activities on the *Early Numeracy Activities* scale. Students **Often** engaged in early numeracy activities had a score on the scale of at least 10.3, which corresponds to their parents "often" doing three of the six activities with them and "sometimes" doing the other three, on average. Students **Never or Almost Never** engaged in such activities had a score no higher than 6.9, which corresponds to parents "never or almost never" doing three of the six activities with them and "sometimes" doing the other three, on average. All other students had parents who **Sometimes** engaged them in early numeracy activities.

Country	Often		Sometimes		Never or Almost Never		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Hungary	75 (0.9)	528 (2.9)	23 (0.8)	495 (4.9)	1 (0.4)	~ ~	11.1 (0.04)
Czech Republic	75 (0.8)	514 (2.3)	25 (0.8)	508 (3.6)	0 (0.1)	~ ~	11.0 (0.03)
Slovak Republic	73 (1.0)	514 (3.3)	25 (0.8)	499 (5.2)	2 (0.5)	~ ~	11.1 (0.05)
Northern Ireland s	70 (1.2)	583 (3.5)	29 (1.2)	566 (4.9)	1 (0.2)	~ ~	11.2 (0.05)
Russian Federation	69 (1.1)	547 (3.7)	29 (1.0)	533 (4.7)	2 (0.3)	~ ~	10.9 (0.04)
Poland	68 (0.9)	488 (2.3)	31 (0.9)	471 (3.0)	1 (0.2)	~ ~	10.8 (0.03)
Ireland	66 (0.9)	539 (2.9)	33 (0.8)	517 (3.7)	2 (0.3)	~ ~	10.9 (0.04)
Australia s	61 (1.2)	540 (3.7)	36 (1.2)	520 (4.1)	3 (0.4)	488 (13.4)	10.7 (0.05)
Austria	61 (0.9)	515 (2.6)	38 (0.9)	502 (3.5)	2 (0.2)	~ ~	10.4 (0.03)
Croatia	60 (0.8)	496 (2.3)	39 (0.8)	482 (2.6)	1 (0.2)	~ ~	10.5 (0.03)
Germany r	59 (1.0)	538 (2.3)	40 (1.0)	528 (2.8)	2 (0.2)	~ ~	10.4 (0.03)
Slovenia	58 (1.2)	518 (2.3)	41 (1.0)	510 (2.8)	2 (0.4)	~ ~	10.4 (0.04)
Malta	57 (0.9)	510 (1.6)	38 (0.8)	489 (2.7)	5 (0.4)	464 (5.8)	10.3 (0.03)
Italy	56 (1.0)	515 (2.8)	41 (0.9)	507 (2.9)	3 (0.3)	479 (10.1)	10.3 (0.03)
Spain	48 (0.9)	494 (3.0)	48 (0.9)	480 (3.0)	4 (0.4)	458 (7.8)	9.9 (0.03)
Lithuania	47 (0.9)	541 (2.8)	49 (0.9)	532 (3.1)	4 (0.4)	493 (7.1)	9.9 (0.03)
Romania	46 (1.6)	510 (4.8)	41 (1.4)	469 (8.0)	13 (1.5)	424 (12.7)	9.7 (0.10)
Portugal	45 (1.2)	543 (3.2)	50 (1.1)	530 (3.9)	5 (0.5)	509 (7.0)	9.9 (0.04)
United Arab Emirates	45 (0.7)	456 (2.1)	50 (0.6)	425 (2.3)	5 (0.3)	404 (5.8)	9.9 (0.03)
Norway	42 (1.3)	505 (2.9)	56 (1.2)	491 (3.3)	2 (0.3)	~ ~	9.8 (0.05)
Qatar	42 (1.1)	436 (4.8)	51 (0.9)	408 (3.6)	8 (0.6)	381 (7.0)	9.8 (0.05)
Singapore	40 (0.8)	619 (3.5)	52 (0.7)	602 (3.3)	8 (0.4)	581 (4.3)	9.7 (0.04)
Georgia	38 (1.3)	465 (4.3)	49 (1.0)	448 (3.9)	13 (1.1)	426 (9.9)	9.5 (0.08)
Saudi Arabia	37 (1.4)	424 (7.1)	54 (1.3)	407 (5.2)	10 (0.9)	387 (9.0)	9.5 (0.06)
Iran, Islamic Rep. of	34 (1.1)	451 (4.6)	54 (0.9)	429 (3.6)	12 (0.9)	387 (6.2)	9.2 (0.06)
Finland	33 (0.8)	554 (3.0)	63 (0.9)	544 (2.8)	3 (0.3)	523 (6.6)	9.5 (0.02)
Sweden	33 (1.0)	517 (2.8)	61 (0.9)	505 (2.0)	6 (0.4)	488 (5.6)	9.4 (0.03)
Chinese Taipei	32 (0.8)	613 (2.4)	53 (0.9)	587 (2.2)	14 (0.8)	561 (3.9)	9.2 (0.04)
Hong Kong SAR	29 (0.8)	617 (3.4)	60 (0.9)	604 (2.6)	11 (0.6)	597 (4.1)	9.1 (0.03)
Azerbaijan	28 (1.1)	469 (6.2)	59 (1.3)	466 (6.5)	13 (1.0)	454 (9.1)	9.1 (0.06)
Oman	26 (0.6)	413 (3.9)	60 (0.7)	382 (3.2)	14 (0.5)	359 (4.1)	8.9 (0.03)
Morocco	18 (0.9)	338 (6.8)	54 (1.5)	333 (4.3)	28 (1.8)	344 (8.8)	8.2 (0.10)
International Avg.	49 (0.2)	510 (0.7)	45 (0.2)	493 (0.7)	6 (0.1)	460 (1.8)	

* Available only for countries that administered both TIMSS and PIRLS to the same fourth grade students because the items for this scale were included in the PIRLS Home Questionnaire completed by parents.

Centerpoint of scale set at 10.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

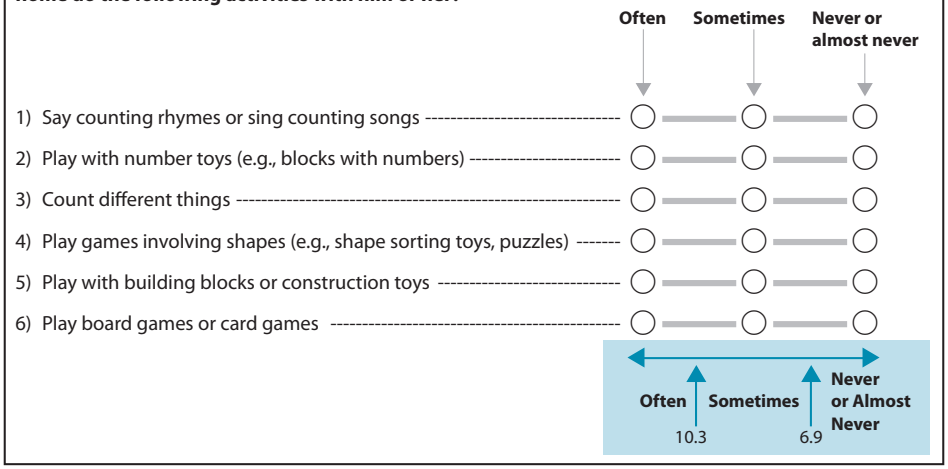
SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 4.9: Early Numeracy Activities Before Beginning Primary School* (Continued)

TIMSS 2011 Mathematics 4th Grade

Country	Often		Sometimes		Never or Almost Never		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Sixth Grade Participants							
Honduras	19 (1.1)	408 (9.6)	48 (1.2)	399 (5.3)	33 (1.3)	386 (6.8)	8.2 (0.08)
Botswana	18 (1.1)	458 (7.0)	53 (1.2)	424 (3.7)	28 (1.4)	401 (5.3)	8.3 (0.08)
Benchmarking Participants							
Quebec, Canada	57 (1.1)	539 (2.6)	41 (1.1)	530 (3.0)	2 (0.4)	~ ~	10.4 (0.04)
Dubai, UAE	52 (0.9)	494 (2.1)	43 (0.8)	455 (2.7)	5 (0.4)	429 (8.7)	10.2 (0.03)
Abu Dhabi, UAE	42 (1.2)	439 (4.6)	53 (1.1)	408 (4.8)	6 (0.5)	379 (9.8)	9.8 (0.05)

Before your child began primary/elementary school, how often did you or someone else in your home do the following activities with him or her?



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 4.10: Students Attended Preprimary Education*

TIMSS 2011 4th Grade Mathematics

Curriculum Reported by National Research Coordinators and Preprimary Attendance Reported by Parents

Country		National Preprimary Curriculum Includes Mathematics Skills	Students Attended Preprimary Education							
			3 Years or More		Less than 3 Years but More than 1 Year		1 Year or Less		Did Not Attend	
			Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Hungary		●	86 (0.9)	526 (3.1)	12 (0.7)	473 (6.6)	1 (0.3)	~ ~	0 (0.1)	~ ~
Italy		●	74 (0.9)	515 (2.6)	23 (0.8)	497 (3.4)	1 (0.2)	~ ~	1 (0.2)	~ ~
Germany	r	○	74 (0.9)	536 (2.3)	23 (0.9)	528 (3.0)	1 (0.2)	~ ~	1 (0.2)	~ ~
Sweden		●	74 (1.1)	513 (2.0)	20 (1.0)	499 (2.7)	2 (0.4)	~ ~	3 (0.4)	485 (8.5)
Norway		●	72 (1.6)	500 (3.1)	24 (1.4)	486 (3.8)	2 (0.2)	~ ~	3 (0.5)	490 (11.4)
Austria		○	69 (1.5)	511 (3.0)	27 (1.3)	509 (3.7)	3 (0.7)	500 (7.5)	1 (0.1)	~ ~
Russian Federation		○	68 (1.3)	545 (3.5)	14 (0.8)	542 (5.5)	3 (0.3)	530 (10.0)	15 (1.0)	531 (6.4)
Hong Kong SAR		●	68 (1.0)	609 (2.9)	31 (1.0)	604 (2.8)	1 (0.1)	~ ~	0 (0.1)	~ ~
Czech Republic		○	68 (1.1)	516 (2.8)	28 (0.9)	507 (3.2)	3 (0.4)	508 (7.2)	1 (0.2)	~ ~
Spain		●	66 (1.1)	492 (2.8)	28 (1.0)	474 (4.0)	4 (0.4)	466 (6.4)	3 (0.3)	469 (7.9)
Slovak Republic		●	65 (1.3)	520 (3.1)	24 (0.8)	497 (4.4)	8 (0.7)	483 (6.7)	4 (0.7)	464 (16.4)
Singapore		○	64 (0.7)	618 (3.2)	34 (0.7)	591 (3.6)	1 (0.1)	~ ~	1 (0.1)	~ ~
Slovenia		●	59 (1.3)	519 (2.3)	26 (1.1)	511 (3.5)	5 (0.5)	502 (4.7)	9 (0.7)	500 (4.9)
Romania		●	57 (1.9)	505 (4.6)	33 (1.3)	468 (8.1)	4 (0.7)	430 (16.6)	6 (1.0)	383 (19.2)
Lithuania		●	52 (1.2)	545 (2.8)	17 (0.6)	538 (4.7)	7 (0.5)	525 (5.1)	24 (1.3)	509 (4.9)
Finland		●	46 (1.3)	547 (2.6)	31 (1.0)	543 (3.3)	21 (1.1)	550 (3.5)	1 (0.3)	~ ~
Portugal		○	46 (1.3)	540 (3.2)	37 (1.3)	536 (4.0)	8 (0.7)	518 (6.5)	9 (0.8)	516 (5.4)
Croatia		○	44 (1.6)	505 (2.2)	19 (0.8)	489 (3.0)	10 (1.2)	471 (5.1)	27 (1.6)	475 (3.2)
Georgia		●	42 (1.3)	457 (4.1)	29 (0.9)	458 (4.2)	7 (0.6)	455 (8.2)	22 (1.3)	434 (6.7)
Chinese Taipei		●	38 (0.9)	598 (2.3)	56 (0.9)	590 (2.2)	4 (0.4)	576 (8.4)	1 (0.2)	~ ~
Poland		○	34 (1.3)	503 (2.9)	23 (1.0)	484 (3.0)	16 (1.1)	467 (4.3)	28 (1.9)	463 (3.0)
Morocco	r	●	21 (0.9)	351 (5.2)	39 (1.6)	338 (5.9)	17 (1.0)	324 (6.7)	23 (1.7)	333 (10.4)
Australia	s	Varies by state	14 (0.9)	546 (8.5)	55 (1.4)	535 (3.6)	25 (1.2)	523 (3.2)	5 (0.5)	505 (9.0)
Qatar		●	12 (0.9)	417 (6.5)	51 (1.5)	436 (4.0)	19 (0.8)	405 (5.1)	18 (1.2)	378 (6.5)
United Arab Emirates		●	12 (0.3)	432 (4.3)	49 (0.9)	439 (2.1)	16 (0.4)	448 (3.1)	22 (0.7)	431 (3.4)
Malta		●	11 (0.6)	503 (4.1)	86 (0.6)	500 (1.4)	3 (0.3)	495 (8.7)	1 (0.2)	~ ~
Iran, Islamic Rep. of		●	10 (0.8)	454 (8.0)	29 (1.1)	448 (4.0)	40 (1.2)	433 (3.4)	21 (1.5)	396 (5.5)
Oman		●	8 (0.4)	389 (5.7)	36 (0.8)	405 (3.8)	25 (0.6)	384 (3.9)	31 (0.8)	367 (3.8)
Azerbaijan		○	7 (0.6)	469 (7.2)	20 (1.3)	468 (7.1)	8 (0.5)	451 (9.9)	64 (1.7)	465 (6.6)
Ireland		●	7 (0.6)	521 (5.5)	56 (1.4)	536 (3.0)	25 (1.1)	534 (3.9)	12 (0.7)	511 (6.7)
Northern Ireland	s	○	4 (0.5)	594 (13.1)	49 (1.7)	581 (4.2)	44 (1.7)	577 (3.8)	3 (0.4)	557 (15.8)
Saudi Arabia		●	3 (0.3)	428 (12.7)	20 (1.4)	428 (4.6)	25 (1.3)	418 (6.7)	52 (2.2)	400 (6.9)
Armenia		○								
Bahrain		○								
Belgium (Flemish)		●								
Chile		●								
Denmark		●								
England		●								
Japan		●								
Kazakhstan		●								
Korea, Rep. of		●								
Kuwait		○								
Netherlands		●								
New Zealand		●								
Serbia		●								
Thailand		○								
Tunisia		●								
Turkey		●								
United States		Varies by state								
Yemen		○								
International Avg.			43 (0.2)	507 (0.9)	33 (0.2)	498 (0.7)	11 (0.1)	479 (1.4)	13 (0.2)	457 (1.9)

● Yes ○ No

* Available only for countries that administered both TIMSS and PIRLS to the same fourth grade students because this item was included in the PIRLS Home Questionnaire completed by parents.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 4.10: Students Attended Preprimary Education* (Continued)

Country	National Preprimary Curriculum Includes Mathematics Skills	Students Attended Preprimary Education							
		3 Years or More		Less than 3 Years, but More than 1 Year		1 Year or Less		Did Not Attend	
		Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Sixth Grade Participants									
Honduras	○	21 (1.6)	377 (9.8)	36 (1.7)	410 (6.7)	28 (1.6)	399 (5.3)	15 (1.0)	390 (8.3)
Botswana r	●	15 (0.8)	451 (6.4)	22 (1.2)	461 (6.8)	7 (0.6)	441 (6.9)	56 (1.9)	402 (3.9)
Yemen	○								
Benchmarking Participants									
Dubai, UAE	●	14 (0.6)	464 (3.8)	46 (0.8)	483 (2.5)	17 (0.6)	489 (4.9)	23 (1.0)	453 (4.0)
Abu Dhabi, UAE	●	12 (0.6)	419 (8.2)	50 (1.6)	422 (4.6)	18 (0.8)	426 (5.5)	21 (1.0)	411 (6.2)
Quebec, Canada	●	11 (0.7)	540 (4.1)	32 (1.5)	531 (2.7)	51 (1.6)	538 (2.8)	5 (0.5)	526 (6.6)
Alberta, Canada	●								
Ontario, Canada	●								
Florida, US	●								
North Carolina, US	●								

● Yes ○ No

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

to increase enrollment in preprimary education. Of course, school policies of entering primary school at older ages (e.g., age 7 in Finland, Lithuania, and Sweden) permit opportunities for more years of preschool attendance than when children start primary school at younger ages (e.g., age 4 or 5 in England, Ireland, the Netherlands, New Zealand, and Northern Ireland). Exhibit C.1 in Appendix C contains information across countries, about the different policies and practices about the age of entry to primary school.

Exhibit 4.10 presents the TIMSS 2011 parents' reports on the number of years their children participated in preprimary education for countries that administered both TIMSS and PIRLS to the same fourth grade students. In addition, for all participants in the fourth grade TIMSS 2011 assessment, the exhibit presents National Research Coordinators' reports of whether or not there was a national preprimary curriculum that includes mathematics skills. It is noted that these preprimary curricula may involve only rudimentary numeric and spatial skills as well as perhaps experiencing some technology, yet two-thirds of the TIMSS 2011 fourth grade countries indicated that their preprimary curriculum made such provision, as did Botswana among the sixth grade countries and all the benchmarking participants.

Although attendance in preprimary education differed dramatically from country to country, on average, 43 percent of the fourth grade students had at least three years of preprimary education and another 33 percent had more than one year. These students had higher average achievement than their counterparts (11%) with only one year or less of preprimary education (507 and 498 vs. 479, respectively). Most notably, however, the 13 percent of students, on average, that did not attend preschool had much lower average mathematics achievement (457). There was a range across countries, but the majority of students did not attend preschool in Azerbaijan (64%) and Saudi Arabia (52%). Also, among the sixth grade participants, the majority of students in Botswana (56%) did not attend preprimary education.

Students Could Do Early Numeracy Tasks When Began Primary School

Considering that 1) parents are students' first teachers and many parents make great efforts to foster their children's literacy and numeracy skills, and 2) substantial percentages of students in some countries have attended several years of preprimary education, it is not surprising that many students begin primary school with some numeracy skills. Again, however, it is recognized

that the earlier students start primary school, the fewer years they will have had available for preprimary education.

To provide information about the extent to which students enter primary school equipped with some basic skills as a foundation for formal mathematics instruction, the TIMSS 2011 fourth grade assessment has, for the first time, included a set of questions asking parents how well their child could do the following early numeracy tasks when he or she first entered primary school: count by himself/herself, recognize different shapes (e.g., square, triangle, and circle), recognize the written numbers from 1 to 10, write the numbers from 1 to 10, do simple addition, and do simple subtraction.

A number of recent studies have shown a positive relationship between early numeracy and literacy skills and later achievement in primary school. For example, an analysis of a national sample of kindergarten students from the US early childhood longitudinal study showed that fifth grade achievement in mathematics, science, and reading was positively related to their skills in these areas in their kindergarten entry year (Princiotta, Flanagan, & Hausken, 2006). Also, a recent Canadian meta-analysis of six longitudinal studies found school entry skills in mathematics and reading to be among the strongest predictors of later achievement across gender and socioeconomic backgrounds (Duncan, et al., 2007). More specifically, the authors found that early mathematics skills had the greatest predictive power.

Exhibit 4.11 presents the TIMSS 2011 results for the Early Numeracy Tasks scale. Students were scored according to their parents' responses to how well their children could do the six tasks, with some being able to do all six tasks **Very Well**, on average, and some doing the six tasks **Not Well**, on average. There was some variation, but across the fourth grade countries, on average, almost one-fourth of parents (25%) reported that their children entered primary school able to perform the six early numeracy tasks **Very Well**, and almost three-fourths (71%) **Moderately Well**. Internationally, mathematics achievement at the fourth grade was substantially higher for those students whose parents reported their children could perform the activities **Very Well** than for the students whose parents reported **Moderately Well** (524 vs. 492). Average achievement was much lower (451) for those students (4%) whose parents reported that their children could do all six numeracy tasks "not very well" or "not at all." This achievement relationship also was evident among the sixth grade and benchmarking participants.

Exhibit 4.11: Could Do Early Numeracy Tasks When Began Primary School*

TIMSS 2011 4th Grade Mathematics

Reported by Parents

Students were scored according to their parents' responses to how well their children could do the six tasks on the *Early Numeracy Tasks* scale. Students who could do numeracy tasks **Very Well** had a score on the scale of at least 12.5, which corresponds to their parents reporting that the students could do all six numeracy tasks (the first four at the highest level, as well as do simple addition and subtraction). Students doing the tasks **Not Well** had a score no higher than 6.4, which corresponds to parents reporting that students could do the first four tasks at a minimal level (responded in the second lowest category) and could not do simple addition and subtraction, on average. All other students could do the numeracy tasks **Moderately Well** when they began primary school.

Country	Very Well		Moderately Well		Not Well		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Chinese Taipei	64 (0.8)	603 (1.9)	35 (0.8)	573 (3.0)	0 (0.1)	~ ~	11.7 (0.02)
Hong Kong SAR	63 (0.8)	615 (2.6)	37 (0.8)	594 (3.2)	0 (0.1)	~ ~	11.7 (0.02)
Singapore	54 (1.0)	626 (3.0)	45 (1.0)	585 (3.5)	0 (0.1)	~ ~	11.4 (0.03)
Qatar	37 (0.9)	431 (4.2)	61 (0.9)	409 (3.8)	2 (0.2)	~ ~	10.6 (0.03)
Finland	36 (1.1)	573 (2.6)	62 (1.1)	533 (2.6)	1 (0.2)	~ ~	10.7 (0.05)
Oman	33 (0.7)	405 (3.4)	64 (0.7)	379 (3.2)	2 (0.2)	~ ~	10.5 (0.03)
Saudi Arabia	29 (1.2)	427 (5.1)	67 (1.2)	406 (6.4)	4 (0.9)	365 (20.0)	10.3 (0.08)
Russian Federation	29 (1.2)	568 (4.1)	68 (1.2)	533 (3.7)	3 (0.4)	492 (9.9)	10.4 (0.06)
United Arab Emirates	29 (0.5)	449 (2.6)	68 (0.5)	433 (2.1)	3 (0.2)	425 (6.2)	10.3 (0.03)
Spain	28 (0.9)	506 (3.0)	69 (0.9)	479 (2.8)	3 (0.3)	442 (7.8)	10.4 (0.04)
Romania	27 (1.4)	525 (5.1)	64 (1.5)	474 (6.1)	9 (1.3)	407 (13.1)	9.9 (0.11)
Croatia	27 (0.8)	516 (3.3)	72 (0.8)	481 (1.8)	1 (0.2)	~ ~	10.4 (0.03)
Sweden	25 (0.9)	535 (3.0)	72 (0.9)	500 (2.0)	2 (0.4)	~ ~	10.3 (0.04)
Malta	23 (0.9)	518 (2.6)	75 (0.9)	496 (1.3)	2 (0.2)	~ ~	10.2 (0.03)
Georgia	22 (1.0)	477 (3.9)	74 (0.9)	445 (4.1)	4 (0.4)	413 (14.2)	10.0 (0.05)
Lithuania	20 (0.7)	567 (3.1)	76 (0.8)	528 (2.6)	4 (0.5)	472 (8.1)	9.9 (0.04)
Czech Republic	20 (0.8)	544 (3.4)	79 (0.8)	505 (2.1)	1 (0.2)	~ ~	10.0 (0.03)
Hungary	18 (0.7)	554 (4.1)	78 (0.8)	513 (3.3)	4 (0.6)	453 (22.1)	9.7 (0.05)
Morocco	18 (0.8)	361 (6.6)	70 (1.2)	329 (4.4)	12 (1.4)	339 (16.6)	9.2 (0.10)
Azerbaijan	18 (1.1)	477 (8.1)	73 (1.1)	467 (5.9)	10 (1.0)	429 (10.8)	9.4 (0.09)
Iran, Islamic Rep. of	18 (0.8)	461 (4.9)	74 (1.1)	430 (3.7)	8 (0.9)	382 (8.5)	9.4 (0.07)
Germany r	17 (0.8)	557 (3.3)	80 (0.8)	529 (2.2)	3 (0.3)	500 (7.1)	9.8 (0.04)
Poland	16 (0.7)	515 (3.5)	79 (0.7)	478 (2.1)	5 (0.4)	428 (6.4)	9.7 (0.05)
Norway	15 (0.7)	531 (4.2)	82 (0.9)	493 (2.8)	4 (0.5)	451 (8.8)	9.5 (0.04)
Slovak Republic	14 (0.6)	545 (5.7)	80 (0.8)	506 (3.4)	6 (0.8)	472 (10.0)	9.3 (0.06)
Austria	14 (0.7)	537 (4.2)	81 (0.8)	506 (2.7)	5 (0.4)	479 (4.7)	9.4 (0.03)
Australia s	13 (0.7)	565 (7.4)	82 (0.9)	530 (3.3)	5 (0.5)	473 (7.2)	9.3 (0.04)
Portugal	13 (0.6)	563 (4.3)	82 (1.0)	531 (3.4)	5 (0.9)	520 (17.6)	9.4 (0.05)
Slovenia	12 (0.7)	553 (3.5)	81 (0.8)	511 (2.2)	7 (0.5)	482 (6.9)	9.3 (0.04)
Italy	10 (0.5)	540 (4.7)	83 (0.7)	509 (2.7)	7 (0.5)	489 (6.1)	9.1 (0.03)
Northern Ireland s	6 (0.8)	609 (8.8)	83 (0.9)	579 (3.4)	11 (0.7)	558 (7.8)	8.6 (0.05)
Ireland	– –	– –	– –	– –	– –	– –	– –
International Avg.	25 (0.2)	524 (0.8)	71 (0.2)	492 (0.6)	4 (0.1)	451 (2.5)	

* Available only for countries that administered both TIMSS and PIRLS to the same fourth grade students because the items for this scale were included in the PIRLS Home Questionnaire completed by parents.

Centerpoint of scale set at 10.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

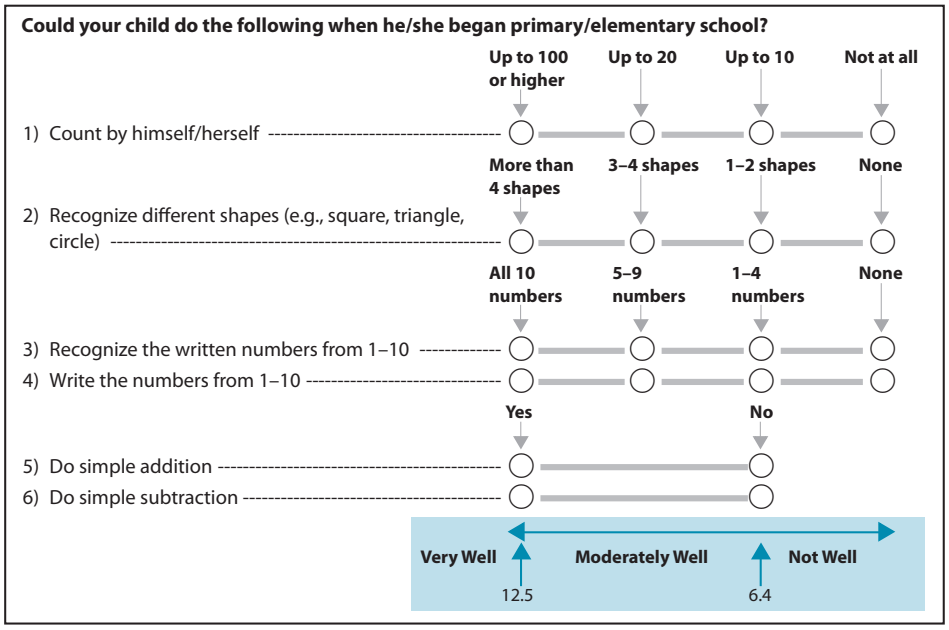
A dash (–) indicates comparable data not available. A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 4.11: Could Do Early Numeracy Tasks When Began Primary School* (Continued)

Country	Very Well		Moderately Well		Not Well		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Sixth Grade Participants							
Honduras	31 (1.3)	412 (7.1)	66 (1.3)	391 (5.4)	3 (0.5)	356 (16.2)	10.4 (0.07)
Botswana	14 (1.0)	475 (7.3)	75 (1.3)	420 (3.7)	11 (1.2)	384 (7.1)	9.1 (0.09)
Benchmarking Participants							
Abu Dhabi, UAE	31 (1.2)	435 (4.9)	66 (1.2)	412 (4.8)	2 (0.4)	~ ~	10.4 (0.05)
Dubai, UAE	24 (0.7)	485 (3.4)	72 (0.7)	471 (1.8)	4 (0.3)	462 (8.9)	10.0 (0.03)
Quebec, Canada	15 (0.7)	561 (5.0)	81 (0.8)	531 (2.4)	4 (0.4)	507 (5.6)	9.4 (0.04)



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Chapter 5



School Resources for Teaching Mathematics

The most successful schools tend to have students that are relatively economically affluent, speak the language of instruction, and begin school with early numeracy skills. Successful schools also are likely to have better working conditions and facilities as well as more instructional materials, such as books, computers, technological support, and supplies.

The learning environment of the school can be a positive influence, encouraging a positive attitude toward academic excellence and facilitating classroom instruction. Considerable research has shown that higher levels of school resources are associated with higher achievement. However, the relationship between resources and achievement is complicated. First, a school can have a more socioeconomically advantaged student population, for example, because of its location or because it competes for students. Second, the school system can invest more money into schools for such things as facilities, teachers' salaries, equipment, and materials. It follows that the most successful schools are likely to have more socioeconomically advantaged students and better resources.

Schools with Students from Advantaged Home Backgrounds

The home backgrounds of students attending a school can be closely related to the learning environment, with the two reinforcing each other and being strongly linked to academic achievement. Students from home backgrounds supportive of learning are likely to have more positive attitudes toward learning and, perhaps, even better discipline. Beyond that, parents that have high educational expectations for their children are more likely to take an active interest in the quality of teachers and school facilities.

School Location

Depending on each country's characteristics, a school's location can have a substantial impact on whether the students attending that school typically are from economically and educationally advantaged home backgrounds. Also, depending on the country, the location of the school can provide access to important additional resources (e.g., libraries, media centers, or museums) or mean that the school is relatively isolated.

To provide some information about the urbanicity of each school's location, TIMSS 2011 asked principals to describe the population size of the city, town, or area in which their schools were located. For the fourth grade mathematics assessment, Exhibit 5.1 shows the percentages of students together with their average achievement for schools located in cities, towns, or areas of three different population sizes: cities of more than 100,000; cities or towns of 15,001 to 100,000; and small towns, villages, or rural areas of 15,000 or fewer people. Countries are presented in alphabetical order with the fourth grade on

the first page of the exhibit, followed by the sixth grade and the benchmarking participants on the second page.

On average, across the fourth grade countries, 31 percent of the students attended schools in cities with more than 100,000 people, 27 percent attended schools in cities or towns of 15,001 to 100,000, and 42 percent in small towns, villages, or rural areas. In general, the fourth grade students attending schools in the largest cities had the highest average mathematics achievement (501), followed by students in medium sized cities (489), and then those in smaller towns and rural areas (477). While this pattern held for the majority of the countries in the fourth grade assessment, there were also other patterns. In some countries, students attending schools in medium sized cities of 15,001 to 100,000 had higher average achievement than students in schools in larger cities, or there was not much difference in average achievement between the two. There were also a number of countries where average mathematics achievement was highest among students attending schools in small towns or rural areas. The countries that assessed TIMSS 2011 in the sixth grade had relatively large percentages of students (64–77%) attending schools in small towns or rural areas, and these students had lower average mathematics achievement than students in schools in large or medium sized cities.

Exhibit 5.2 shows principals' reports about school location for the TIMSS 2011 eighth grade assessment, with percentages of students and average achievement for the eighth grade students on the first page and results for countries assessing the ninth grade and benchmarking participants on the second page. Compared to the fourth grade assessment, the results indicated a slight shift away from small towns and rural areas into large cities. For the eighth grade assessment, 37 percent of students were attending schools in cities with a population more than 100,000, 28 percent were attending schools in medium sized cities or towns of 15,001 to 100,000, and 35 percent in small towns or rural areas of 15,000 or fewer people. Average achievement differences among students attending the three types of schools were more pronounced than at the fourth grade, and more strongly related to degree of urbanicity, with average achievement highest in the big-city schools (484), next highest in schools in medium sized cities (463), and lowest in schools in small towns or rural areas (450). As with the fourth grade, this pattern did not hold in all countries and there was considerable variation.

Exhibit 5.1: School Location

TIMSS 2011 4th Grade Mathematics

Reported by Principals

Country	Population Size of City, Town, or Area Where School Is Located					
	More than 100,000		15,001 to 100,000		15,000 or Fewer	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Armenia	27 (3.0)	464 (5.2)	26 (3.4)	455 (6.1)	46 (3.2)	443 (6.5)
Australia	42 (3.3)	532 (4.6)	30 (3.9)	502 (5.7)	28 (4.1)	511 (5.3)
Austria	24 (1.5)	502 (5.2)	9 (1.9)	502 (5.0)	66 (2.3)	511 (3.2)
Azerbaijan	16 (2.9)	464 (8.7)	21 (2.9)	481 (14.9)	63 (3.5)	456 (7.2)
Bahrain	11 (3.3)	443 (10.8)	28 (5.1)	431 (8.4)	61 (5.5)	437 (5.0)
Belgium (Flemish)	6 (1.9)	539 (12.3)	55 (4.1)	545 (2.4)	39 (3.8)	559 (2.8)
Chile	56 (3.5)	476 (3.9)	28 (3.3)	453 (5.9)	16 (2.5)	437 (6.4)
Chinese Taipei	56 (3.5)	603 (2.4)	39 (3.3)	576 (3.2)	6 (2.0)	572 (10.6)
Croatia	16 (2.2)	509 (3.9)	23 (3.3)	493 (3.5)	61 (3.7)	484 (2.8)
Czech Republic	15 (2.5)	518 (9.0)	33 (3.1)	513 (3.5)	52 (3.2)	507 (3.3)
Denmark r	15 (2.6)	524 (8.3)	37 (3.6)	550 (4.3)	48 (3.2)	536 (3.1)
England	40 (5.2)	533 (6.9)	38 (5.0)	533 (7.2)	23 (3.9)	569 (6.3)
Finland	31 (3.9)	545 (4.2)	39 (4.2)	549 (2.7)	30 (3.3)	540 (5.4)
Georgia	37 (2.9)	472 (5.7)	17 (2.3)	449 (6.9)	46 (2.4)	432 (6.0)
Germany	25 (3.2)	518 (4.6)	33 (3.7)	527 (3.9)	42 (3.5)	537 (2.4)
Hong Kong SAR r	84 (3.4)	603 (5.0)	15 (3.2)	611 (7.5)	1 (1.2)	~ ~
Hungary	25 (2.6)	537 (6.9)	29 (3.2)	536 (4.8)	46 (2.2)	492 (6.4)
Iran, Islamic Rep. of	45 (3.5)	455 (6.0)	18 (2.9)	433 (9.1)	36 (3.4)	399 (4.8)
Ireland	16 (3.0)	515 (7.7)	27 (3.2)	519 (5.7)	57 (3.0)	536 (3.9)
Italy	16 (2.3)	510 (5.4)	34 (3.2)	505 (5.0)	50 (3.3)	509 (3.8)
Japan	64 (2.9)	591 (2.4)	33 (3.0)	578 (2.4)	3 (1.4)	561 (9.1)
Kazakhstan	26 (3.0)	511 (8.7)	21 (2.8)	486 (8.4)	54 (3.0)	500 (6.8)
Korea, Rep. of	86 (2.8)	609 (2.1)	9 (2.1)	586 (3.0)	5 (2.2)	579 (5.8)
Kuwait	12 (2.7)	339 (13.1)	38 (4.2)	347 (6.3)	50 (4.2)	343 (5.3)
Lithuania	35 (1.7)	556 (3.8)	19 (2.8)	532 (3.9)	46 (2.9)	518 (4.1)
Malta	0 (0.0)	~ ~	13 (0.1)	482 (3.7)	87 (0.1)	498 (1.4)
Morocco r	30 (3.4)	368 (7.0)	27 (3.6)	324 (6.7)	43 (3.9)	319 (6.9)
Netherlands r	25 (4.9)	535 (4.3)	59 (5.5)	543 (2.6)	16 (3.7)	545 (4.0)
New Zealand	40 (3.6)	501 (4.3)	23 (3.2)	467 (6.3)	37 (3.1)	484 (4.0)
Northern Ireland r	23 (3.6)	565 (8.9)	29 (4.9)	561 (7.6)	48 (4.4)	569 (4.9)
Norway	20 (2.8)	495 (6.9)	45 (3.8)	497 (3.8)	34 (3.5)	488 (5.1)
Oman r	4 (1.4)	359 (12.7)	17 (2.5)	395 (6.6)	79 (2.5)	377 (3.9)
Poland	24 (0.9)	500 (5.4)	24 (2.1)	485 (3.7)	52 (2.3)	472 (3.0)
Portugal	14 (2.6)	551 (7.8)	28 (4.6)	524 (4.5)	58 (4.6)	530 (5.4)
Qatar	34 (3.0)	453 (8.6)	24 (2.7)	400 (9.5)	42 (3.1)	386 (6.1)
Romania	21 (2.7)	538 (6.2)	15 (2.4)	516 (7.6)	65 (2.5)	457 (8.2)
Russian Federation	48 (1.6)	557 (4.5)	22 (2.3)	537 (5.5)	30 (2.0)	523 (7.2)
Saudi Arabia	57 (3.7)	410 (8.2)	15 (2.9)	420 (10.0)	28 (3.9)	404 (8.7)
Serbia	28 (3.2)	535 (5.2)	34 (3.7)	517 (5.4)	38 (3.2)	499 (5.5)
Singapore	100 (0.0)	606 (3.2)	0 (0.0)	~ ~	0 (0.0)	~ ~
Slovak Republic	11 (2.1)	545 (7.4)	35 (3.3)	519 (3.6)	54 (2.9)	491 (5.8)
Slovenia	14 (2.8)	523 (5.6)	21 (3.4)	515 (4.2)	65 (3.6)	510 (2.6)
Spain	37 (3.6)	491 (4.8)	34 (3.6)	483 (5.0)	30 (3.6)	476 (4.7)
Sweden	16 (3.5)	510 (6.6)	38 (4.5)	505 (4.0)	46 (5.0)	500 (2.9)
Thailand	8 (2.2)	516 (14.4)	22 (2.7)	470 (11.1)	70 (3.1)	447 (5.2)
Tunisia	12 (2.7)	380 (10.5)	28 (3.5)	370 (7.5)	60 (3.3)	349 (5.1)
Turkey	52 (2.4)	489 (5.7)	21 (2.3)	480 (8.1)	28 (2.4)	424 (10.8)
United Arab Emirates	50 (1.8)	449 (3.5)	22 (1.7)	425 (5.5)	28 (1.8)	408 (5.4)
United States	33 (2.1)	539 (4.8)	36 (2.6)	547 (3.3)	31 (2.4)	542 (3.4)
Yemen	15 (3.1)	269 (15.0)	10 (2.2)	271 (17.9)	75 (3.5)	241 (7.4)
International Avg.	31 (0.4)	501 (1.1)	27 (0.5)	489 (1.0)	42 (0.5)	477 (0.8)

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A tilde (~) indicates insufficient data to report achievement.
An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 5.1: School Location (Continued)

Country	Population Size of City, Town, or Area Where School Is Located					
	More than 100,000		15,001 to 100,000		15,000 or Fewer	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Sixth Grade Participants						
Botswana	3 (1.6)	469 (35.5)	20 (3.2)	454 (12.3)	77 (3.3)	407 (3.5)
Honduras	21 (4.0)	439 (13.1)	15 (2.6)	428 (4.7)	64 (3.8)	375 (6.5)
Yemen	18 (3.6)	369 (10.4)	13 (2.8)	359 (14.4)	69 (3.9)	336 (7.1)
Benchmarking Participants						
Alberta, Canada	46 (4.4)	514 (4.1)	21 (3.7)	506 (2.8)	33 (3.6)	499 (4.4)
Ontario, Canada	62 (3.7)	522 (4.4)	21 (3.8)	513 (4.9)	16 (3.1)	513 (4.3)
Quebec, Canada	37 (4.0)	534 (4.3)	35 (4.4)	536 (3.6)	28 (4.5)	527 (4.1)
Abu Dhabi, UAE	46 (3.9)	438 (7.9)	21 (3.5)	392 (11.9)	33 (3.6)	394 (6.6)
Dubai, UAE	65 (0.3)	474 (2.4)	19 (0.2)	475 (2.3)	16 (0.2)	434 (3.7)
Florida, US r	52 (6.6)	543 (6.1)	36 (6.0)	548 (6.5)	13 (4.2)	541 (15.7)
North Carolina, US r	23 (5.5)	565 (12.3)	33 (7.1)	551 (10.7)	45 (6.7)	554 (5.7)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 5.2: School Location

TIMSS 2011 8th Grade Mathematics

Reported by Principals

Country	Population Size of City, Town, or Area Where School Is Located					
	More than 100,000		15,001 to 100,000		15,000 or Fewer	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Armenia	24 (2.8)	492 (5.4)	24 (3.5)	475 (7.5)	52 (3.5)	451 (4.5)
Australia	55 (3.2)	523 (7.2)	28 (3.5)	504 (9.0)	16 (2.9)	464 (6.1)
Bahrain	17 (0.3)	412 (4.9)	42 (0.3)	404 (3.3)	41 (0.3)	418 (3.2)
Chile	55 (3.5)	431 (4.6)	29 (3.8)	401 (6.8)	16 (2.9)	403 (7.3)
Chinese Taipei	63 (3.5)	624 (3.8)	34 (3.6)	586 (7.9)	3 (1.3)	570 (33.9)
England	49 (5.0)	507 (8.0)	36 (4.6)	502 (10.3)	15 (3.2)	536 (15.9)
Finland	24 (3.3)	514 (6.1)	42 (4.1)	514 (3.2)	34 (3.4)	512 (3.6)
Georgia	31 (2.4)	455 (5.9)	17 (2.4)	442 (14.4)	52 (2.5)	412 (5.2)
Ghana	19 (3.0)	370 (7.8)	13 (2.5)	343 (12.5)	68 (3.2)	317 (5.4)
Hong Kong SAR	88 (3.1)	588 (4.6)	9 (2.9)	564 (22.2)	3 (1.8)	630 (13.5)
Hungary	27 (2.4)	526 (7.4)	27 (3.1)	523 (5.2)	46 (2.4)	483 (4.3)
Indonesia	68 (4.1)	394 (6.2)	20 (4.1)	373 (7.6)	12 (3.0)	361 (11.5)
Iran, Islamic Rep. of	48 (3.4)	445 (7.2)	20 (2.7)	404 (7.0)	32 (3.4)	377 (6.0)
Israel	26 (3.0)	547 (6.5)	45 (4.0)	508 (8.8)	29 (3.2)	507 (8.3)
Italy	17 (2.7)	507 (6.2)	39 (3.4)	493 (5.1)	43 (3.7)	499 (3.4)
Japan	67 (3.2)	573 (3.3)	27 (3.4)	567 (3.8)	5 (1.8)	551 (18.4)
Jordan	26 (3.0)	419 (6.6)	31 (3.4)	411 (6.3)	42 (3.4)	397 (6.6)
Kazakhstan	26 (3.3)	504 (6.8)	21 (3.2)	488 (9.4)	53 (3.2)	478 (6.1)
Korea, Rep. of	87 (2.6)	616 (3.0)	10 (2.0)	594 (6.7)	3 (1.7)	567 (5.7)
Lebanon	21 (3.2)	469 (8.9)	37 (4.3)	445 (7.5)	42 (4.0)	440 (5.2)
Lithuania	31 (2.3)	533 (4.4)	19 (3.1)	501 (5.2)	50 (3.1)	484 (4.0)
Macedonia, Rep. of	21 (3.1)	454 (14.4)	36 (3.2)	431 (8.4)	43 (3.0)	409 (8.1)
Malaysia	18 (3.1)	465 (11.1)	49 (4.4)	448 (7.4)	33 (3.4)	413 (10.3)
Morocco	47 (2.7)	380 (2.9)	32 (2.9)	370 (4.3)	21 (2.5)	353 (4.4)
New Zealand	48 (5.0)	497 (9.4)	32 (4.7)	494 (6.9)	20 (3.1)	456 (7.7)
Norway	25 (2.0)	484 (4.0)	43 (3.2)	474 (3.9)	32 (2.8)	467 (4.0)
Oman	8 (1.2)	422 (10.0)	21 (2.8)	377 (7.4)	70 (3.0)	355 (3.0)
Palestinian Nat'l Auth.	22 (3.2)	408 (8.4)	35 (4.1)	397 (6.3)	43 (3.5)	407 (5.9)
Qatar	29 (0.7)	441 (8.1)	32 (0.5)	413 (4.5)	39 (0.3)	395 (3.9)
Romania	24 (2.8)	509 (9.9)	16 (2.9)	477 (7.3)	60 (2.8)	433 (6.1)
Russian Federation	48 (2.1)	550 (5.2)	20 (2.4)	544 (7.2)	31 (2.2)	518 (7.0)
Saudi Arabia	57 (3.2)	403 (5.9)	18 (2.8)	395 (11.0)	24 (3.0)	369 (9.9)
Singapore	100 (0.0)	611 (3.8)	0 (0.0)	~ ~	0 (0.0)	~ ~
Slovenia	13 (2.1)	516 (7.1)	21 (3.5)	503 (5.5)	66 (3.7)	504 (2.5)
Sweden r	22 (3.6)	491 (5.6)	42 (4.4)	487 (3.2)	36 (4.5)	480 (3.6)
Syrian Arab Republic	26 (3.2)	385 (8.1)	26 (3.9)	374 (7.6)	47 (3.5)	380 (7.3)
Thailand	11 (2.6)	470 (16.1)	36 (3.5)	428 (6.9)	53 (3.5)	415 (5.7)
Tunisia	16 (2.8)	444 (10.0)	44 (3.4)	430 (3.2)	39 (3.5)	410 (4.0)
Turkey	54 (2.3)	465 (6.3)	21 (2.4)	458 (8.5)	25 (2.0)	420 (6.9)
Ukraine	31 (3.0)	511 (6.2)	18 (2.7)	479 (6.2)	52 (2.9)	461 (6.2)
United Arab Emirates	48 (2.4)	474 (4.1)	23 (2.0)	444 (4.5)	30 (2.3)	435 (3.9)
United States	30 (2.4)	499 (6.9)	43 (2.7)	516 (3.8)	27 (1.8)	515 (5.7)
International Avg.	37 (0.5)	484 (1.1)	28 (0.5)	463 (1.2)	35 (0.4)	450 (1.4)

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A tilde (~) indicates insufficient data to report achievement.
An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 5.2: School Location (Continued)

Country	Population Size of City, Town, or Area Where School Is Located					
	More than 100,000		15,001 to 100,000		15,000 or Fewer	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Ninth Grade Participants						
Botswana	15 (2.6)	425 (8.0)	60 (3.9)	395 (3.3)	25 (3.5)	381 (4.3)
Honduras	24 (3.6)	360 (10.5)	27 (4.1)	337 (6.9)	49 (4.2)	326 (4.7)
South Africa	19 (2.5)	398 (10.9)	32 (3.1)	358 (4.8)	50 (3.3)	329 (4.4)
Benchmarking Participants						
Alberta, Canada	53 (3.7)	508 (4.3)	18 (3.3)	507 (4.3)	29 (3.2)	500 (3.8)
Ontario, Canada	63 (3.5)	515 (3.7)	20 (3.7)	511 (4.9)	17 (3.0)	500 (4.6)
Quebec, Canada	45 (3.5)	532 (4.4)	39 (4.0)	530 (3.1)	16 (2.4)	535 (8.2)
Abu Dhabi, UAE	43 (4.2)	472 (8.6)	26 (4.1)	427 (6.8)	31 (4.1)	436 (6.5)
Dubai, UAE	66 (0.4)	488 (3.0)	16 (0.4)	497 (6.8)	18 (0.2)	432 (2.9)
Alabama, US r	10 (5.1)	476 (23.6)	42 (9.2)	467 (13.1)	48 (6.7)	463 (7.4)
California, US r	41 (6.3)	479 (10.5)	53 (6.8)	501 (7.8)	7 (2.4)	503 (12.3)
Colorado, US	40 (6.4)	511 (9.0)	45 (7.3)	519 (7.8)	15 (3.0)	525 (15.1)
Connecticut, US	12 (2.9)	452 (7.5)	64 (5.6)	525 (8.4)	24 (5.0)	532 (14.4)
Florida, US r	58 (5.1)	516 (12.2)	36 (4.8)	517 (9.8)	6 (3.4)	497 (26.0)
Indiana, US r	17 (5.1)	501 (18.8)	51 (6.0)	527 (8.1)	32 (5.1)	524 (9.5)
Massachusetts, US	9 (2.9)	507 (13.6)	67 (6.5)	568 (6.8)	24 (5.7)	568 (10.3)
Minnesota, US	13 (4.5)	519 (21.1)	43 (5.6)	551 (7.5)	44 (5.6)	549 (6.6)
North Carolina, US	30 (4.6)	535 (18.0)	36 (7.9)	530 (9.7)	35 (6.9)	543 (11.9)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

School Composition by Student Background

Ever since the Coleman report (Coleman, et al., 1966), researchers have recognized that the compositional characteristics of a school's student body can affect student achievement. Essentially, students from disadvantaged backgrounds typically have higher achievement if they attend schools where the majority of students are from advantaged backgrounds. To provide information on this topic, TIMSS routinely asks school principals to report on two demographic characteristics of their schools:

- Economic home background; and
- Language home background.

Previous assessments have found both to be strongly related to average mathematics achievement. For example, in TIMSS 2007 the mathematics achievement of students attending schools with a higher proportion of economically advantaged students was higher than for those attending schools with large proportions of disadvantaged students. Also, mathematics achievement was highest for students in schools where most students spoke the language of the TIMSS assessment as their first language, and was progressively lower as percentages of students not having the TIMSS language as their first language increased.

Exhibit 5.3 presents, for participants in the TIMSS 2011 fourth grade assessment, principals' economic categorizations of their schools according to three categories that are fully described on the second page of the exhibit. To summarize, the **More Affluent** schools had more than one-fourth of their students from affluent home backgrounds and not more than one-fourth from disadvantaged home backgrounds, and the **More Disadvantaged** schools had the reverse situation. The other schools were "in between." Internationally, the students were distributed relatively equally across the three types of schools. On average, across countries at the fourth grade, 36 percent of the students attended schools with relatively more affluent students than disadvantaged students, and students in these schools had the highest average achievement (508). At the other end of the range, 30 percent of the students attended schools with relatively more disadvantaged students than affluent students, and students in these schools had the lowest average achievement (470). Although this overall achievement pattern was observed in most countries and benchmarking participants, there was a wide variation among participants in the percentages of students attending the three different economic categories of schools.

Exhibit 5.4 presents principals' economic categorizations of their schools for participants in the TIMSS 2011 eighth grade assessment. Similar to the fourth grade assessment, internationally the students were distributed relatively equally across the three types of schools, with 32 percent of the eighth grade students attending schools with relatively more affluent than disadvantaged students and 36 percent attending schools with relatively more disadvantaged than affluent students. Again, the percentages in each school category varied considerably across countries. Also similar to the fourth grade assessment, average mathematics achievement was highest among the eighth grade students attending schools with relatively more affluent students (494) and lowest among students attending schools with relatively more disadvantaged students (448).

Exhibit 5.5 presents, for participants in the fourth grade assessment, principals' categorizations of their schools according to the percentage of students who had the language of the TIMSS 2011 assessment as their native language. Approximately three-fourths of the fourth grade students (73%) were in schools where almost all students (more than 90%) spoke the language of the TIMSS test as their native language, 15 percent were in schools where the majority of students (51–90%) were native speakers of the TIMSS assessment language, and 13 percent were in schools where half the students (or less) spoke the language of the test as their native language. On average across the fourth grade countries, mathematics achievement was highest among students in schools where almost all students were native speakers of the TIMSS assessment language (491), next highest in schools where 51–90% of students were native speakers (482), and lowest in schools where half the students or less were native speakers (471). Among countries participating at the sixth grade, Botswana was notable for having almost all students (92%) in schools with half or less native speakers.

Exhibit 5.6 presents principals' categorizations of their schools in terms of their students being native speakers of the TIMSS assessment language for participants in the eighth grade assessment. Similar to the fourth grade assessment, most eighth grade students (69%) were in schools where almost all students (more than 90%) spoke the language of the TIMSS assessment as their native language, 13 percent were in schools where the majority of students (51–90%) were native speakers of the TIMSS assessment language, and 17 percent were in schools where half the students (or less) spoke the language of the assessment as their native language. Similar to the fourth grade, the eighth grade students in schools with the most native speakers had higher average achievement (471) than those in schools with fewest native speakers (461), but the achievement gap between the two was smaller than at the fourth grade.

Exhibit 5.3: School Composition by Student Economic Background

TIMSS 2011 4th Grade Mathematics

Reported by Principals

Country		More Affluent - Schools Where More than 25% of Students Come from Economically Affluent Homes and Not More than 25% from Economically Disadvantaged Homes		Neither More Affluent nor More Disadvantaged		More Disadvantaged - Schools Where More than 25% of Students Come from Economically Disadvantaged Homes and Not More than 25% from Economically Affluent homes	
		Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Armenia		38 (3.9)	458 (5.8)	20 (3.3)	458 (9.3)	42 (4.0)	445 (5.5)
Australia		32 (3.9)	544 (4.8)	41 (4.0)	517 (4.8)	27 (3.4)	486 (6.0)
Austria		31 (4.0)	516 (3.9)	48 (3.8)	514 (2.9)	21 (3.9)	483 (6.1)
Azerbaijan	r	11 (2.5)	479 (15.2)	32 (4.7)	481 (14.5)	57 (4.9)	454 (8.5)
Bahrain	r	46 (6.1)	453 (5.7)	35 (5.7)	430 (7.4)	19 (3.7)	409 (11.3)
Belgium (Flemish)		64 (4.6)	556 (2.2)	26 (4.2)	542 (4.1)	10 (2.6)	532 (8.2)
Chile	r	11 (2.2)	514 (8.0)	33 (4.6)	487 (5.1)	57 (4.2)	445 (3.9)
Chinese Taipei		22 (3.3)	600 (5.0)	67 (3.5)	593 (2.6)	11 (2.0)	559 (6.5)
Croatia		38 (4.0)	498 (3.2)	38 (4.2)	488 (3.0)	24 (3.2)	485 (5.5)
Czech Republic		37 (3.7)	515 (3.9)	46 (4.4)	514 (3.0)	17 (3.1)	489 (7.0)
Denmark	r	60 (3.9)	546 (3.1)	31 (3.9)	536 (3.7)	9 (2.5)	512 (11.1)
England	r	34 (4.8)	573 (7.6)	29 (4.5)	541 (7.2)	36 (4.2)	521 (6.7)
Finland		43 (4.2)	552 (3.3)	47 (4.3)	544 (4.0)	10 (2.6)	521 (5.6)
Georgia		16 (3.0)	465 (11.8)	41 (4.3)	457 (7.2)	43 (4.0)	443 (6.6)
Germany		21 (2.8)	538 (3.4)	53 (3.7)	537 (2.8)	26 (3.3)	501 (4.8)
Hong Kong SAR	r	21 (3.5)	608 (11.5)	29 (4.5)	607 (6.2)	50 (4.7)	599 (4.7)
Hungary		21 (3.6)	555 (5.8)	31 (4.3)	536 (5.3)	48 (4.0)	488 (6.4)
Iran, Islamic Rep. of		27 (3.6)	464 (8.6)	27 (4.1)	433 (8.0)	46 (4.2)	410 (4.7)
Ireland	r	39 (4.5)	546 (3.6)	30 (3.8)	531 (7.0)	31 (3.7)	498 (4.5)
Italy		37 (3.8)	507 (5.3)	43 (3.7)	510 (3.5)	20 (2.9)	499 (6.5)
Japan		46 (4.3)	589 (3.3)	45 (4.4)	583 (2.3)	9 (2.6)	573 (6.8)
Kazakhstan		73 (3.6)	502 (4.9)	19 (3.4)	493 (11.2)	8 (2.3)	504 (26.6)
Korea, Rep. of		17 (3.7)	627 (5.7)	62 (4.7)	605 (2.5)	21 (3.2)	590 (2.8)
Kuwait	r	57 (3.7)	352 (5.3)	28 (3.8)	326 (8.5)	15 (3.2)	323 (8.9)
Lithuania		19 (3.3)	560 (6.1)	43 (4.6)	538 (4.5)	38 (3.5)	519 (3.2)
Malta		47 (0.1)	500 (2.1)	43 (0.1)	496 (2.1)	10 (0.1)	461 (3.5)
Morocco	s	12 (2.1)	377 (17.7)	13 (2.9)	333 (14.9)	75 (2.9)	326 (6.7)
Netherlands	r	70 (5.2)	547 (2.2)	21 (5.0)	538 (4.4)	9 (2.5)	509 (11.0)
New Zealand		33 (3.0)	520 (4.5)	41 (3.3)	486 (3.2)	26 (2.8)	448 (5.3)
Northern Ireland	r	36 (4.7)	589 (4.4)	38 (4.3)	562 (4.4)	26 (3.8)	527 (6.7)
Norway		53 (5.2)	501 (4.1)	44 (5.2)	491 (4.1)	3 (1.3)	475 (15.5)
Oman	r	44 (3.4)	391 (4.1)	25 (2.9)	372 (5.6)	31 (2.9)	373 (6.5)
Poland		8 (2.1)	488 (12.0)	61 (3.8)	487 (2.9)	31 (3.7)	468 (3.8)
Portugal		31 (4.6)	540 (4.7)	39 (5.1)	540 (4.7)	31 (4.9)	511 (6.2)
Qatar	r	68 (3.0)	411 (4.9)	21 (2.3)	429 (6.6)	11 (1.9)	351 (7.8)
Romania		19 (3.1)	523 (10.7)	24 (4.0)	487 (9.8)	57 (4.8)	472 (7.7)
Russian Federation		58 (3.2)	553 (4.3)	29 (3.3)	529 (6.9)	13 (2.1)	528 (10.3)
Saudi Arabia	r	42 (4.7)	423 (11.2)	30 (4.3)	420 (6.1)	29 (4.0)	389 (11.6)
Serbia		18 (3.6)	521 (7.6)	37 (4.3)	516 (5.4)	45 (4.4)	516 (4.9)
Singapore		40 (0.0)	629 (5.0)	50 (0.0)	593 (4.6)	10 (0.0)	584 (13.7)
Slovak Republic		24 (3.3)	525 (4.7)	56 (3.4)	512 (3.6)	20 (3.2)	462 (11.7)
Slovenia		42 (4.0)	515 (3.9)	40 (4.0)	514 (2.6)	18 (3.0)	504 (7.4)
Spain		51 (4.1)	491 (4.1)	31 (3.7)	488 (4.1)	18 (3.2)	455 (7.8)
Sweden	r	77 (4.1)	509 (2.7)	17 (4.1)	490 (5.8)	7 (1.5)	466 (6.2)
Thailand	r	18 (3.8)	505 (11.8)	17 (3.3)	476 (9.8)	65 (4.2)	443 (6.1)
Tunisia		30 (3.4)	380 (6.5)	27 (3.9)	370 (7.7)	43 (4.3)	334 (5.9)
Turkey		14 (2.3)	535 (8.5)	24 (3.0)	484 (12.7)	63 (3.4)	449 (5.7)
United Arab Emirates	r	68 (2.2)	436 (3.5)	20 (1.6)	443 (4.9)	12 (1.7)	409 (7.1)
United States	r	19 (2.2)	574 (6.2)	31 (2.5)	555 (3.4)	50 (2.6)	523 (2.4)
Yemen	r	8 (2.9)	309 (16.0)	12 (3.5)	280 (18.5)	81 (4.3)	234 (7.5)
International Avg.		36 (0.5)	508 (1.0)	35 (0.6)	494 (1.0)	30 (0.5)	470 (1.2)

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

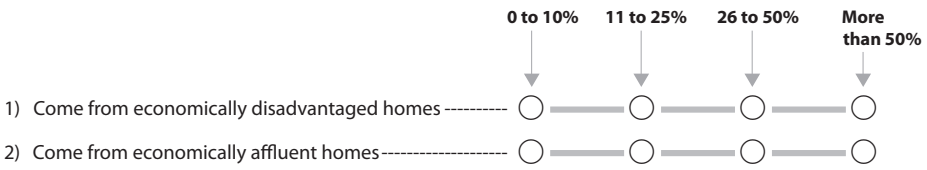
SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 5.3: School Composition by Student Economic Background (Continued)

Country		More Affluent - Schools Where More than 25% of Students Come from Economically Affluent Homes and Not More than 25% from Economically Disadvantaged Homes		Neither More Affluent nor More Disadvantaged		More Disadvantaged - Schools Where More than 25% of Students Come from Economically Disadvantaged Homes and Not More than 25% from Economically Affluent homes	
		Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Sixth Grade Participants							
Botswana		32 (3.6)	449 (7.5)	25 (4.0)	408 (8.5)	43 (4.3)	395 (4.4)
Honduras	r	16 (4.0)	469 (16.4)	13 (3.8)	382 (15.5)	71 (4.9)	388 (5.8)
Yemen	r	7 (2.9)	390 (8.6)	13 (3.2)	361 (18.0)	80 (3.6)	345 (7.5)
Benchmarking Participants							
Alberta, Canada		37 (4.3)	514 (3.8)	51 (4.5)	507 (3.2)	12 (2.8)	484 (10.5)
Ontario, Canada		36 (4.4)	534 (4.6)	36 (4.3)	520 (3.7)	28 (4.4)	496 (5.8)
Quebec, Canada		60 (4.1)	538 (2.8)	25 (4.0)	525 (6.3)	15 (2.7)	522 (6.0)
Abu Dhabi, UAE	s	75 (4.5)	417 (7.7)	12 (3.2)	430 (17.9)	13 (3.5)	389 (9.3)
Dubai, UAE	r	67 (0.4)	465 (2.2)	22 (0.3)	487 (4.6)	11 (0.2)	411 (5.5)
Florida, US	r	11 (4.4)	590 (11.4)	20 (4.7)	566 (11.3)	69 (4.6)	531 (3.0)
North Carolina, US	r	21 (6.0)	584 (9.5)	16 (5.3)	552 (6.1)	64 (7.5)	547 (6.4)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Approximately what percentage of students in your school have the following backgrounds?



More Affluent - Schools where more than 25% of students come from economically affluent homes and not more than 25% from economically disadvantaged homes

More Disadvantaged - Schools where more than 25% of students come from economically disadvantaged homes and not more than 25% from economically affluent homes

Neither More Affluent nor More Disadvantaged - All other possible response combinations

Exhibit 5.4: School Composition by Student Economic Background

TIMSS 2011 8th Grade Mathematics

Reported by Principals

Country	More Affluent - Schools Where More than 25% of Students Come from Economically Affluent Homes and Not More than 25% from Economically Disadvantaged Homes		Neither More Affluent nor More Disadvantaged		More Disadvantaged - Schools Where More than 25% of Students Come from Economically Disadvantaged Homes and Not More than 25% from Economically Affluent homes	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Armenia	35 (3.7)	484 (5.9)	24 (3.6)	461 (7.5)	41 (3.7)	455 (5.0)
Australia	32 (3.4)	543 (11.2)	39 (3.7)	507 (6.1)	29 (3.1)	476 (7.5)
Bahrain	45 (0.3)	420 (3.2)	28 (0.2)	408 (2.7)	27 (0.3)	395 (3.7)
Chile r	12 (2.3)	474 (13.0)	32 (4.1)	439 (6.0)	56 (3.9)	399 (4.8)
Chinese Taipei	17 (2.7)	649 (7.9)	69 (3.8)	604 (4.2)	14 (2.9)	577 (13.5)
England	28 (4.1)	553 (11.0)	50 (4.5)	498 (8.9)	22 (4.3)	487 (10.9)
Finland r	30 (3.4)	519 (4.0)	67 (3.8)	513 (3.0)	3 (1.5)	486 (3.5)
Georgia	11 (2.0)	436 (13.7)	44 (4.4)	438 (6.8)	45 (4.2)	417 (6.8)
Ghana	7 (2.0)	392 (13.9)	18 (3.4)	331 (10.6)	75 (3.6)	321 (5.2)
Hong Kong SAR	11 (3.0)	628 (11.8)	37 (5.1)	609 (10.2)	53 (4.8)	561 (7.8)
Hungary	16 (2.7)	535 (7.4)	33 (4.1)	531 (4.9)	50 (4.3)	478 (5.6)
Indonesia	16 (3.3)	426 (9.9)	28 (4.6)	400 (8.1)	56 (4.6)	369 (6.0)
Iran, Islamic Rep. of	20 (2.7)	472 (11.2)	25 (3.5)	429 (9.1)	54 (3.8)	390 (5.2)
Israel	28 (3.5)	556 (7.8)	30 (4.5)	526 (8.8)	42 (3.9)	481 (8.8)
Italy	40 (3.7)	515 (3.7)	47 (3.9)	495 (3.8)	13 (2.6)	465 (8.9)
Japan	46 (4.4)	582 (4.5)	44 (4.5)	564 (4.1)	10 (2.9)	548 (9.0)
Jordan r	32 (3.5)	431 (7.0)	25 (2.9)	402 (9.7)	43 (3.9)	388 (6.3)
Kazakhstan	75 (3.5)	487 (4.4)	20 (3.4)	493 (11.0)	5 (1.8)	462 (22.5)
Korea, Rep. of	18 (3.3)	653 (5.8)	51 (4.3)	612 (2.6)	32 (3.9)	591 (4.6)
Lebanon r	21 (4.1)	491 (8.8)	34 (4.2)	455 (8.7)	45 (5.0)	435 (5.3)
Lithuania	23 (3.6)	537 (6.5)	39 (4.4)	499 (4.3)	38 (4.0)	487 (4.5)
Macedonia, Rep. of r	38 (3.6)	458 (7.9)	30 (4.1)	428 (10.0)	32 (3.9)	401 (9.7)
Malaysia	26 (3.2)	467 (10.5)	23 (3.3)	452 (12.4)	52 (4.1)	424 (8.8)
Morocco r	6 (1.4)	422 (15.0)	13 (2.5)	393 (9.8)	81 (2.9)	361 (2.6)
New Zealand	30 (5.6)	522 (6.9)	47 (5.8)	485 (7.4)	24 (4.0)	450 (10.6)
Norway	– –	– –	– –	– –	– –	– –
Oman	43 (3.1)	386 (4.6)	26 (2.6)	360 (5.6)	31 (3.1)	339 (5.8)
Palestinian Nat'l Auth.	44 (4.2)	411 (6.5)	23 (3.9)	402 (8.7)	33 (3.7)	393 (6.1)
Qatar r	81 (0.2)	403 (4.3)	16 (0.2)	448 (6.6)	3 (0.1)	435 (18.2)
Romania	18 (2.9)	479 (12.7)	29 (4.2)	471 (8.1)	52 (4.3)	447 (6.2)
Russian Federation	58 (3.5)	553 (5.1)	25 (2.8)	527 (4.4)	16 (3.1)	513 (10.3)
Saudi Arabia r	40 (4.4)	405 (7.5)	30 (4.4)	394 (10.5)	29 (4.1)	382 (8.2)
Singapore	27 (0.0)	643 (5.9)	61 (0.0)	604 (4.9)	11 (0.0)	569 (11.6)
Slovenia	40 (3.8)	510 (4.4)	45 (4.3)	506 (2.7)	15 (2.7)	489 (6.8)
Sweden r	74 (4.4)	490 (2.6)	21 (4.1)	472 (5.5)	5 (1.8)	466 (11.9)
Syrian Arab Republic r	37 (4.2)	388 (8.0)	27 (4.3)	392 (9.5)	36 (4.4)	371 (8.2)
Thailand	20 (3.0)	466 (13.9)	24 (3.6)	437 (9.5)	57 (4.4)	410 (5.7)
Tunisia	23 (3.3)	439 (9.6)	29 (3.3)	432 (3.9)	48 (3.5)	411 (3.0)
Turkey	17 (2.6)	533 (11.6)	25 (3.3)	455 (6.0)	59 (3.8)	428 (5.1)
Ukraine	13 (2.7)	486 (14.1)	29 (3.9)	486 (7.4)	59 (4.5)	472 (5.1)
United Arab Emirates r	70 (2.0)	459 (3.4)	17 (1.9)	442 (7.3)	13 (1.4)	441 (5.6)
United States	22 (1.9)	543 (5.8)	23 (1.9)	526 (6.1)	55 (1.9)	490 (3.4)
International Avg.	32 (0.5)	494 (1.4)	33 (0.6)	471 (1.2)	36 (0.5)	448 (1.3)

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A dash (–) indicates comparable data not available.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

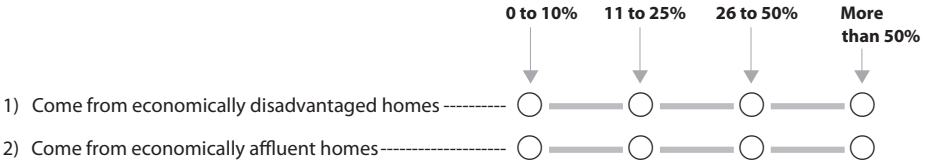
SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 5.4: School Composition by Student Economic Background (Continued)

Country		More Affluent - Schools Where More than 25% of Students Come from Economically Affluent Homes and Not More than 25% from Economically Disadvantaged Homes		Neither More Affluent nor More Disadvantaged		More Disadvantaged - Schools Where More than 25% of Students Come from Economically Disadvantaged Homes and Not More than 25% from Economically Affluent homes	
		Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Ninth Grade Participants							
Botswana		13 (3.0)	432 (10.9)	24 (4.0)	401 (4.4)	63 (4.6)	384 (2.7)
Honduras	s	5 (1.6)	383 (12.5)	14 (3.4)	358 (12.3)	82 (3.6)	333 (4.4)
South Africa	r	8 (1.3)	487 (14.4)	12 (2.6)	356 (15.0)	80 (2.7)	339 (3.2)
Benchmarking Participants							
Alberta, Canada		39 (4.1)	517 (3.6)	43 (4.8)	505 (3.3)	18 (3.8)	482 (5.9)
Ontario, Canada		37 (4.1)	523 (5.1)	36 (4.7)	510 (3.8)	27 (4.5)	498 (5.2)
Quebec, Canada	r	51 (4.1)	542 (4.3)	32 (3.8)	523 (5.2)	17 (3.5)	514 (6.3)
Abu Dhabi, UAE	r	76 (4.1)	453 (6.1)	17 (3.6)	429 (10.3)	7 (2.4)	446 (14.9)
Dubai, UAE	r	71 (0.3)	484 (3.2)	12 (0.2)	449 (2.9)	16 (0.2)	434 (3.8)
Alabama, US	r	17 (4.4)	492 (19.0)	5 (3.4)	481 (41.0)	78 (5.6)	455 (6.1)
California, US	r	16 (4.2)	541 (12.3)	20 (5.2)	532 (16.7)	64 (5.4)	467 (5.8)
Colorado, US	r	21 (5.7)	525 (9.1)	34 (6.6)	526 (10.9)	46 (7.4)	500 (12.5)
Connecticut, US	r	43 (6.1)	565 (7.8)	27 (6.1)	528 (10.3)	30 (5.9)	455 (8.6)
Florida, US	r	6 (3.4)	500 (18.4)	37 (5.6)	535 (11.1)	58 (6.0)	499 (8.8)
Indiana, US	r	13 (4.5)	573 (7.5)	29 (5.3)	524 (10.1)	58 (5.9)	509 (6.6)
Massachusetts, US		29 (6.8)	589 (9.1)	45 (6.6)	562 (8.0)	26 (4.2)	521 (13.4)
Minnesota, US		18 (3.2)	583 (16.6)	45 (7.1)	546 (5.4)	37 (7.6)	530 (8.4)
North Carolina, US	r	14 (5.6)	560 (16.1)	23 (6.4)	551 (10.9)	63 (6.7)	519 (10.5)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Approximately what percentage of students in your school have the following backgrounds?



More Affluent - Schools where more than 25% of students come from economically affluent homes and not more than 25% from economically disadvantaged homes

More Disadvantaged - Schools where more than 25% of students come from economically disadvantaged homes and not more than 25% from economically affluent homes

Neither More Affluent nor More Disadvantaged - All other possible response combinations

Exhibit 5.5: Schools with Students Having the Language of the Test as Their Native Language

TIMSS 2011 4th Grade Mathematics

Reported by Principals

Country	More than 90% of Students		51–90% of Students		50% of Students or Less	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Armenia	95 (1.6)	452 (3.4)	5 (1.6)	471 (22.2)	0 (0.0)	~ ~
Australia	63 (3.8)	522 (3.5)	21 (2.8)	510 (7.2)	16 (3.1)	505 (10.2)
Austria	33 (4.1)	521 (3.5)	52 (4.7)	507 (3.5)	16 (1.9)	485 (7.2)
Azerbaijan	90 (2.6)	463 (5.5)	5 (1.9)	455 (28.2)	4 (1.8)	469 (43.6)
Bahrain	65 (3.8)	426 (3.8)	13 (2.3)	425 (12.4)	22 (3.0)	460 (10.8)
Belgium (Flemish)	52 (3.7)	561 (2.2)	36 (4.1)	542 (3.0)	12 (2.3)	528 (7.5)
Chile	99 (0.9)	464 (2.5)	1 (0.8)	~ ~	0 (0.0)	~ ~
Chinese Taipei	49 (3.8)	597 (2.7)	36 (3.8)	587 (3.7)	15 (2.6)	582 (6.9)
Croatia	95 (1.7)	492 (1.8)	3 (1.2)	466 (12.9)	1 (1.1)	~ ~
Czech Republic	96 (1.5)	512 (2.2)	2 (1.1)	~ ~	1 (1.0)	~ ~
Denmark r	95 (1.6)	540 (2.6)	4 (1.5)	535 (16.5)	1 (0.6)	~ ~
England	56 (4.7)	542 (5.1)	22 (4.4)	545 (12.2)	22 (4.6)	538 (8.2)
Finland	85 (3.2)	547 (2.4)	15 (3.1)	535 (6.3)	1 (0.8)	~ ~
Georgia	92 (2.3)	450 (3.6)	7 (2.0)	461 (12.8)	1 (1.1)	~ ~
Germany	49 (2.9)	536 (2.3)	37 (2.8)	528 (3.4)	13 (2.4)	503 (6.8)
Hong Kong SAR	94 (1.2)	606 (2.8)	3 (1.6)	519 (66.4)	3 (1.1)	529 (73.5)
Hungary	96 (1.5)	517 (3.8)	3 (1.4)	511 (34.0)	1 (0.0)	~ ~
Iran, Islamic Rep. of	48 (3.4)	462 (4.7)	15 (3.5)	422 (9.1)	37 (2.9)	395 (5.4)
Ireland	64 (3.6)	535 (3.6)	33 (3.9)	519 (5.1)	3 (1.7)	485 (16.7)
Italy	64 (3.7)	509 (3.3)	30 (3.3)	506 (4.5)	6 (1.9)	497 (8.0)
Japan	99 (0.8)	585 (1.7)	1 (0.0)	~ ~	0 (0.0)	~ ~
Kazakhstan	56 (3.7)	491 (6.7)	30 (3.6)	516 (8.0)	14 (2.8)	509 (12.5)
Korea, Rep. of	100 (0.0)	605 (1.9)	0 (0.0)	~ ~	0 (0.0)	~ ~
Kuwait	93 (2.1)	342 (3.6)	6 (1.9)	345 (14.8)	2 (0.8)	~ ~
Lithuania	88 (2.5)	535 (2.8)	8 (1.5)	540 (5.5)	4 (2.0)	503 (24.9)
Malta	6 (0.1)	520 (4.9)	12 (0.1)	517 (3.5)	82 (0.1)	493 (1.6)
Morocco	60 (4.1)	344 (6.2)	13 (2.3)	329 (11.4)	27 (4.1)	318 (8.8)
Netherlands r	75 (4.3)	545 (2.2)	15 (3.7)	538 (7.4)	10 (2.8)	516 (9.5)
New Zealand	58 (3.5)	493 (3.7)	25 (3.1)	490 (6.1)	17 (2.5)	464 (8.7)
Northern Ireland	88 (3.1)	564 (3.8)	7 (2.4)	559 (9.8)	4 (1.9)	555 (11.1)
Norway	64 (4.5)	497 (3.3)	29 (4.6)	490 (6.5)	8 (2.9)	493 (12.2)
Oman	85 (1.9)	381 (3.5)	10 (1.8)	372 (7.9)	5 (1.2)	355 (12.0)
Poland	100 (0.0)	482 (2.2)	0 (0.0)	~ ~	0 (0.0)	~ ~
Portugal	92 (1.9)	534 (3.8)	6 (1.5)	500 (11.4)	2 (1.0)	~ ~
Qatar r	40 (3.2)	378 (6.4)	9 (2.6)	458 (27.9)	51 (3.2)	452 (4.8)
Romania	88 (2.5)	481 (6.6)	8 (2.3)	483 (12.3)	4 (1.7)	496 (17.7)
Russian Federation	73 (3.7)	543 (3.7)	17 (2.8)	539 (6.8)	9 (2.3)	546 (13.9)
Saudi Arabia	88 (2.3)	410 (6.1)	8 (2.2)	390 (13.5)	5 (1.4)	425 (13.6)
Serbia	89 (3.1)	517 (3.5)	10 (2.9)	511 (10.2)	2 (1.0)	~ ~
Singapore	2 (0.0)	~ ~	32 (0.0)	620 (5.0)	65 (0.0)	597 (4.4)
Slovak Republic	89 (2.4)	510 (3.6)	7 (2.2)	496 (22.8)	4 (1.3)	462 (16.5)
Slovenia	70 (2.8)	517 (2.6)	28 (2.9)	506 (4.4)	2 (0.9)	~ ~
Spain	60 (2.8)	487 (4.0)	24 (3.0)	484 (4.6)	16 (2.5)	471 (6.8)
Sweden	56 (3.6)	512 (3.1)	29 (3.2)	504 (4.0)	15 (2.9)	471 (7.0)
Thailand	84 (3.3)	467 (4.3)	4 (1.9)	411 (9.8)	13 (3.3)	413 (16.4)
Tunisia	75 (3.3)	364 (5.2)	5 (2.0)	352 (11.3)	20 (2.6)	348 (9.0)
Turkey	78 (2.5)	479 (5.1)	7 (1.8)	480 (11.7)	15 (2.2)	413 (14.4)
United Arab Emirates	47 (1.4)	405 (3.1)	8 (0.8)	455 (9.2)	45 (1.4)	457 (3.6)
United States	55 (2.5)	550 (2.8)	30 (2.1)	538 (3.8)	15 (2.1)	521 (4.4)
Yemen	92 (2.2)	247 (6.8)	3 (1.2)	244 (10.8)	5 (2.0)	240 (32.2)
International Avg.	73 (0.4)	491 (0.6)	15 (0.4)	482 (2.4)	13 (0.3)	471 (3.2)

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A tilde (~) indicates insufficient data to report achievement.
An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 5.5: Schools with Students Having the Language of the Test as Their Native Language (Continued)

Country	More than 90% of Students		51–90% of Students		50% of Students or Less	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Sixth Grade Participants						
Botswana	5 (1.9)	393 (12.5)	4 (1.7)	466 (35.1)	92 (2.5)	418 (4.1)
Honduras	95 (2.2)	399 (5.8)	3 (1.3)	355 (18.5)	2 (1.7)	~ ~
Yemen	92 (2.4)	349 (6.3)	4 (1.7)	321 (27.8)	4 (2.0)	348 (40.4)
Benchmarking Participants						
Alberta, Canada	56 (4.2)	507 (3.4)	33 (4.2)	509 (3.5)	11 (2.6)	502 (9.0)
Ontario, Canada	50 (3.9)	518 (3.6)	28 (3.9)	525 (6.7)	22 (3.2)	510 (6.6)
Quebec, Canada	69 (3.8)	534 (2.7)	20 (3.2)	535 (5.7)	11 (2.4)	525 (5.5)
Abu Dhabi, UAE	59 (2.5)	389 (5.5)	3 (1.5)	454 (44.1)	38 (2.6)	448 (8.6)
Dubai, UAE	15 (0.2)	430 (4.7)	15 (0.4)	475 (4.7)	69 (0.4)	475 (2.0)
Florida, US	43 (6.2)	551 (5.5)	33 (5.9)	544 (6.8)	24 (5.6)	531 (6.0)
North Carolina, US	61 (7.9)	560 (6.0)	34 (8.1)	549 (9.5)	5 (3.6)	552 (6.2)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 5.6: Schools with Students Having the Language of the Test as Their Native Language

TIMSS 2011 8th Grade Mathematics

Reported by Principals

Country	More than 90% of Students		51–90% of Students		50% of Students or Less	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Armenia	95 (1.6)	465 (2.9)	5 (1.6)	485 (9.3)	0 (0.0)	~ ~
Australia	65 (3.6)	502 (6.3)	25 (3.2)	519 (10.0)	10 (2.2)	525 (11.3)
Bahrain	76 (0.2)	394 (2.5)	9 (0.1)	414 (3.9)	14 (0.2)	490 (3.2)
Chile	99 (0.5)	418 (2.9)	1 (0.0)	~ ~	0 (0.2)	~ ~
Chinese Taipei	62 (4.0)	613 (4.3)	23 (3.1)	605 (8.3)	15 (2.9)	599 (12.5)
England	66 (3.9)	513 (7.3)	21 (3.2)	505 (14.3)	13 (2.9)	482 (14.5)
Finland	87 (3.1)	514 (2.6)	13 (3.1)	508 (5.1)	0 (0.0)	~ ~
Georgia	94 (1.7)	432 (4.1)	6 (1.6)	427 (14.1)	0 (0.0)	~ ~
Ghana	0 (0.0)	~ ~	2 (1.6)	~ ~	98 (1.6)	326 (4.4)
Hong Kong SAR	49 (4.4)	567 (6.4)	3 (1.7)	502 (27.9)	48 (4.3)	607 (8.3)
Hungary	98 (1.1)	505 (3.6)	2 (1.1)	~ ~	0 (0.1)	~ ~
Indonesia	23 (3.8)	398 (12.5)	33 (4.4)	370 (8.0)	43 (3.9)	391 (5.6)
Iran, Islamic Rep. of	50 (2.7)	446 (5.3)	10 (2.0)	380 (8.6)	40 (2.8)	386 (4.6)
Israel	64 (4.0)	515 (5.3)	25 (3.6)	516 (9.6)	11 (2.5)	537 (16.9)
Italy	64 (3.5)	500 (3.3)	31 (3.2)	502 (3.4)	5 (1.5)	470 (14.7)
Japan	98 (1.3)	570 (2.6)	0 (0.0)	~ ~	2 (1.3)	~ ~
Jordan	93 (1.9)	408 (3.6)	4 (1.3)	418 (11.6)	3 (1.3)	338 (47.3)
Kazakhstan	53 (3.6)	475 (5.6)	33 (3.6)	496 (7.3)	14 (3.1)	509 (12.0)
Korea, Rep. of	100 (0.0)	612 (2.9)	0 (0.0)	~ ~	0 (0.0)	~ ~
Lebanon	6 (2.1)	461 (18.8)	8 (2.5)	464 (12.5)	87 (3.1)	447 (4.0)
Lithuania	91 (2.0)	503 (2.7)	6 (1.3)	517 (8.0)	4 (1.6)	468 (40.2)
Macedonia, Rep. of	71 (3.4)	433 (6.8)	19 (3.2)	415 (9.4)	10 (1.9)	408 (16.3)
Malaysia	40 (3.3)	429 (8.8)	24 (3.2)	424 (11.5)	36 (3.6)	462 (9.0)
Morocco	75 (2.9)	374 (2.5)	12 (2.2)	372 (7.1)	13 (2.0)	360 (5.0)
New Zealand	64 (5.2)	490 (5.1)	28 (4.3)	486 (11.6)	9 (3.4)	482 (22.7)
Norway	73 (3.7)	475 (2.8)	21 (3.7)	480 (4.3)	6 (2.1)	454 (11.5)
Oman	84 (1.9)	359 (3.1)	5 (0.9)	366 (12.0)	11 (1.7)	420 (12.0)
Palestinian Nat'l Auth.	96 (1.7)	405 (3.6)	3 (1.6)	386 (16.6)	1 (0.6)	~ ~
Qatar	46 (0.6)	362 (5.0)	5 (1.1)	499 (23.5)	49 (1.0)	438 (3.5)
Romania	90 (2.5)	458 (4.4)	6 (1.8)	452 (17.3)	4 (1.7)	478 (15.0)
Russian Federation	74 (3.9)	538 (4.0)	17 (2.9)	541 (9.6)	9 (2.4)	542 (11.3)
Saudi Arabia	89 (2.4)	395 (5.1)	7 (2.0)	385 (11.6)	3 (1.4)	392 (21.3)
Singapore	7 (0.0)	671 (7.5)	15 (0.0)	626 (9.1)	77 (0.0)	602 (4.3)
Slovenia	72 (3.9)	507 (2.2)	26 (3.8)	503 (5.8)	2 (1.0)	~ ~
Sweden r	53 (4.5)	491 (2.7)	36 (4.6)	479 (4.1)	11 (2.8)	479 (7.9)
Syrian Arab Republic	90 (2.8)	382 (4.8)	9 (2.7)	362 (14.5)	1 (0.6)	~ ~
Thailand	89 (2.3)	430 (4.4)	2 (0.9)	~ ~	9 (2.4)	400 (12.8)
Tunisia	91 (2.0)	423 (3.0)	7 (1.7)	438 (13.2)	3 (1.3)	444 (9.7)
Turkey	80 (2.1)	461 (4.8)	7 (1.9)	450 (11.6)	13 (2.0)	401 (9.9)
Ukraine	76 (3.7)	481 (4.7)	18 (3.4)	475 (6.8)	6 (2.0)	471 (16.2)
United Arab Emirates	56 (1.7)	434 (2.6)	8 (1.1)	479 (10.9)	36 (1.6)	483 (3.7)
United States	65 (1.8)	519 (3.7)	23 (1.9)	505 (6.0)	12 (1.4)	476 (7.5)
International Avg.	69 (0.4)	471 (0.9)	13 (0.4)	465 (1.9)	17 (0.3)	461 (2.8)

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A tilde (~) indicates insufficient data to report achievement.
An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 5.6: Schools with Students Having the Language of the Test as Their Native Language (Continued)

Country	More than 90% of Students		51–90% of Students		50% of Students or Less	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Ninth Grade Participants						
Botswana	4 (1.8)	371 (6.7)	1 (0.7)	~ ~	95 (2.0)	397 (2.3)
Honduras	97 (1.8)	339 (4.0)	2 (1.7)	~ ~	1 (0.4)	~ ~
South Africa	7 (1.3)	441 (12.5)	7 (1.4)	435 (15.3)	85 (1.7)	339 (3.0)
Benchmarking Participants						
Alberta, Canada	51 (4.2)	507 (3.3)	36 (4.2)	507 (4.4)	13 (3.3)	497 (6.8)
Ontario, Canada	51 (3.6)	508 (3.0)	27 (3.1)	515 (5.0)	22 (3.0)	514 (6.9)
Quebec, Canada	66 (3.8)	533 (3.0)	24 (3.2)	535 (7.1)	11 (2.4)	516 (7.8)
Abu Dhabi, UAE	67 (2.6)	430 (4.0)	4 (1.6)	468 (26.0)	30 (2.5)	489 (8.5)
Dubai, UAE	24 (0.3)	437 (3.0)	12 (0.3)	519 (11.9)	64 (0.4)	485 (2.3)
Alabama, US r	84 (6.0)	470 (8.4)	10 (4.9)	467 (9.3)	6 (3.7)	441 (24.7)
California, US r	14 (5.8)	529 (17.9)	47 (6.0)	504 (7.3)	38 (5.7)	463 (9.1)
Colorado, US	45 (5.1)	546 (7.3)	39 (5.5)	502 (9.9)	16 (5.3)	479 (20.6)
Connecticut, US r	73 (4.5)	539 (7.5)	21 (4.3)	473 (13.9)	6 (3.7)	453 (43.1)
Florida, US	43 (6.5)	511 (8.5)	47 (6.6)	522 (11.4)	9 (4.2)	476 (20.7)
Indiana, US r	85 (5.2)	525 (6.6)	15 (5.2)	507 (19.1)	0 (0.0)	~ ~
Massachusetts, US	76 (3.8)	574 (6.1)	10 (3.9)	542 (23.8)	14 (4.5)	497 (12.7)
Minnesota, US	67 (6.5)	549 (5.8)	28 (6.2)	543 (6.1)	5 (3.6)	520 (91.8)
North Carolina, US	69 (6.1)	548 (10.3)	27 (5.6)	512 (8.9)	3 (2.4)	525 (48.0)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 5.7: Schools Where Students Enter the Primary Grades with Early Numeracy Skills

TIMSS 2011 4th Grade Mathematics

Reported by Principals

Country	Schools Where More than 75% Enter with Skills		Schools Where 51–75% Enter with Skills		Schools Where 25–50% Enter with Skills		Schools Where Less than 25% Enter with Skills	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Hong Kong SAR	87 (3.4)	605 (3.6)	10 (3.0)	593 (10.4)	2 (1.1)	~ ~	1 (1.0)	~ ~
Korea, Rep. of	85 (2.8)	604 (2.1)	9 (2.1)	609 (7.6)	4 (2.0)	614 (12.5)	1 (1.0)	~ ~
Singapore	82 (0.0)	608 (3.9)	12 (0.0)	606 (11.4)	5 (0.0)	574 (17.2)	2 (0.0)	~ ~
Thailand	81 (3.4)	460 (5.7)	8 (2.3)	461 (8.5)	7 (2.4)	435 (9.5)	3 (1.5)	449 (16.1)
Chinese Taipei	67 (3.8)	593 (2.5)	18 (3.3)	592 (5.8)	10 (2.6)	576 (7.7)	5 (1.8)	599 (7.9)
Denmark r	67 (3.2)	543 (3.2)	18 (2.6)	531 (7.2)	9 (2.0)	533 (6.1)	6 (1.9)	532 (9.0)
Spain	62 (3.7)	490 (3.5)	26 (3.3)	484 (5.7)	9 (2.2)	458 (8.4)	3 (1.0)	441 (22.1)
Qatar	59 (3.4)	418 (4.5)	11 (2.6)	430 (19.6)	7 (1.8)	402 (21.1)	23 (3.1)	396 (11.8)
Kazakhstan	54 (3.7)	501 (6.2)	21 (3.3)	515 (10.3)	13 (2.5)	485 (13.3)	12 (2.7)	497 (15.1)
United Arab Emirates	53 (2.4)	441 (3.0)	16 (2.0)	428 (7.0)	12 (1.5)	412 (7.9)	19 (1.5)	420 (6.0)
Sweden r	51 (4.9)	509 (3.3)	22 (3.9)	508 (4.9)	12 (2.5)	491 (6.7)	15 (3.0)	488 (5.7)
Bahrain	49 (3.9)	447 (5.5)	19 (3.5)	426 (4.6)	17 (3.5)	424 (6.2)	15 (2.1)	435 (6.9)
Finland	48 (4.9)	555 (2.3)	26 (4.0)	543 (4.2)	10 (2.6)	533 (8.3)	16 (3.8)	531 (8.8)
Romania	48 (4.2)	490 (8.4)	22 (4.1)	476 (14.9)	15 (2.8)	459 (11.8)	15 (3.1)	488 (14.5)
Japan	46 (4.3)	587 (2.7)	31 (3.7)	587 (3.5)	17 (3.3)	581 (5.1)	6 (2.0)	576 (5.9)
Kuwait	43 (4.5)	341 (5.5)	13 (2.6)	339 (11.9)	20 (3.4)	346 (7.9)	24 (3.5)	344 (8.2)
Yemen	42 (4.1)	242 (10.0)	15 (3.3)	260 (14.9)	11 (2.7)	239 (8.7)	32 (4.1)	252 (12.9)
England r	36 (4.9)	545 (9.8)	21 (4.4)	545 (9.2)	10 (3.4)	541 (13.3)	33 (4.6)	533 (6.6)
Chile	36 (3.6)	492 (4.3)	14 (3.3)	467 (8.7)	20 (3.2)	447 (9.0)	30 (3.5)	441 (5.7)
Morocco	33 (3.1)	351 (6.7)	11 (2.1)	323 (9.5)	10 (1.7)	332 (10.8)	46 (3.7)	331 (8.5)
Lithuania	30 (3.6)	545 (5.4)	18 (3.6)	537 (5.9)	24 (3.4)	529 (4.2)	27 (3.7)	527 (7.3)
Russian Federation	30 (3.5)	554 (5.5)	24 (2.4)	546 (9.5)	25 (3.6)	529 (5.1)	21 (2.5)	536 (8.4)
Serbia	30 (4.1)	534 (5.6)	29 (3.6)	510 (5.9)	21 (3.6)	503 (8.1)	20 (3.0)	514 (7.4)
Oman	29 (2.4)	381 (5.6)	21 (2.9)	382 (5.5)	17 (2.6)	380 (6.6)	33 (3.1)	376 (6.2)
Saudi Arabia	27 (3.6)	418 (7.0)	22 (3.4)	419 (8.2)	25 (3.7)	408 (14.1)	26 (3.3)	397 (12.0)
Armenia	27 (3.4)	460 (6.9)	10 (2.7)	456 (8.4)	19 (3.7)	449 (7.9)	44 (4.1)	447 (6.1)
Tunisia	25 (3.9)	372 (9.0)	9 (2.4)	376 (13.0)	11 (2.6)	366 (9.9)	55 (4.1)	349 (5.4)
Malta	25 (0.1)	505 (2.7)	24 (0.1)	508 (2.2)	21 (0.1)	481 (2.9)	30 (0.1)	494 (2.4)
Poland	21 (3.6)	488 (5.3)	27 (4.0)	484 (4.6)	20 (3.6)	476 (6.2)	32 (3.9)	478 (3.0)
Croatia	21 (3.4)	496 (5.1)	28 (3.9)	493 (3.6)	24 (3.5)	484 (4.6)	27 (3.4)	488 (3.9)
Georgia	21 (3.4)	446 (7.7)	15 (3.2)	463 (13.2)	20 (3.1)	449 (9.3)	45 (3.7)	449 (6.4)
Azerbaijan	21 (2.9)	466 (10.9)	17 (3.2)	483 (18.5)	22 (3.3)	442 (11.4)	40 (4.0)	465 (7.4)
Netherlands r	12 (3.2)	533 (7.0)	56 (5.5)	544 (3.2)	18 (3.2)	532 (5.0)	13 (4.5)	550 (3.5)
Norway	12 (3.3)	495 (7.6)	19 (3.6)	494 (5.8)	24 (4.4)	494 (5.4)	44 (4.5)	493 (4.4)
United States r	12 (2.0)	553 (8.7)	12 (1.9)	565 (5.5)	22 (2.3)	547 (4.5)	55 (2.8)	534 (2.7)
Iran, Islamic Rep. of	10 (2.2)	445 (11.1)	8 (2.0)	438 (10.8)	17 (2.7)	439 (8.6)	65 (3.9)	426 (4.9)
Italy	10 (2.1)	510 (10.3)	14 (2.0)	487 (8.1)	20 (3.1)	503 (8.0)	56 (3.3)	515 (2.9)
Australia	9 (2.3)	526 (8.6)	13 (2.6)	527 (8.3)	13 (2.7)	541 (9.4)	65 (3.6)	510 (3.9)
Portugal	9 (2.5)	537 (12.4)	15 (3.2)	540 (7.0)	16 (3.5)	524 (7.8)	59 (4.4)	532 (5.1)
Germany	8 (2.0)	541 (4.3)	17 (3.0)	542 (4.0)	17 (2.7)	532 (3.9)	58 (3.4)	522 (3.1)
Turkey	8 (1.6)	512 (12.0)	8 (1.9)	506 (10.9)	15 (2.5)	473 (8.7)	69 (2.8)	459 (6.4)
Slovenia	8 (2.2)	515 (5.4)	23 (3.5)	512 (4.0)	22 (3.2)	512 (5.0)	47 (4.0)	513 (3.2)
Belgium (Flemish)	5 (2.0)	557 (5.4)	24 (3.7)	552 (3.6)	30 (3.9)	549 (3.6)	40 (4.1)	548 (3.0)
Czech Republic	5 (1.7)	523 (5.6)	11 (2.8)	502 (4.9)	30 (4.1)	511 (4.5)	54 (4.0)	510 (3.7)
Hungary	4 (1.9)	539 (6.9)	7 (2.3)	538 (10.6)	18 (3.7)	532 (8.2)	72 (4.3)	509 (5.0)
New Zealand	3 (1.4)	518 (20.9)	8 (2.5)	515 (9.9)	15 (3.1)	502 (5.7)	73 (4.0)	479 (3.2)
Austria	3 (1.5)	528 (9.5)	5 (2.3)	509 (3.3)	15 (2.7)	515 (5.4)	78 (4.1)	506 (3.1)
Slovak Republic	2 (1.1)	~ ~	16 (2.9)	524 (9.4)	16 (3.0)	505 (4.7)	66 (3.6)	503 (5.2)
Northern Ireland r	0 (0.0)	~ ~	3 (1.8)	539 (18.3)	9 (2.3)	567 (11.4)	88 (2.9)	563 (3.7)
Ireland	– –	– –	– –	– –	– –	– –	– –	– –
International Avg.	32 (0.5)	496 (1.1)	17 (0.4)	494 (1.3)	16 (0.4)	482 (1.3)	35 (0.5)	477 (1.2)

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (–) indicates comparable data not available. A tilde (~) indicates insufficient data to report achievement.
An "r" indicates data are available for at least 70% but less than 85% of the students.

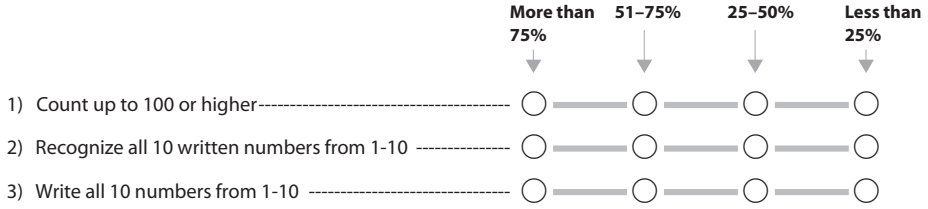
SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 5.7: Schools Where Students Enter the Primary Grades with Early Numeracy Skills (Continued)

Country	Schools Where More than 75% Enter with Skills		Schools Where 51–75% Enter with Skills		Schools Where 25–50% Enter with Skills		Schools Where Less than 25% Enter with Skills	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Sixth Grade Participants								
Honduras	51 (4.8)	406 (8.2)	8 (2.2)	394 (17.4)	9 (2.8)	403 (9.2)	32 (4.4)	379 (10.6)
Yemen	39 (4.2)	340 (9.8)	10 (2.6)	343 (16.2)	17 (3.4)	348 (11.8)	35 (4.2)	353 (10.1)
Botswana	12 (2.4)	469 (16.9)	9 (2.4)	441 (12.2)	6 (2.1)	444 (15.2)	73 (3.5)	406 (4.1)
Benchmarking Participants								
Dubai, UAE	65 (0.4)	465 (2.2)	12 (0.2)	463 (5.5)	4 (0.1)	487 (6.3)	19 (0.4)	469 (3.4)
Abu Dhabi, UAE	52 (3.9)	432 (6.3)	18 (3.4)	390 (10.5)	10 (2.2)	398 (15.0)	21 (2.9)	393 (10.6)
Quebec, Canada	21 (3.8)	542 (5.0)	29 (4.2)	536 (4.0)	17 (3.4)	528 (4.8)	33 (4.4)	526 (4.2)
Alberta, Canada	20 (3.3)	520 (5.2)	15 (3.3)	511 (5.6)	12 (2.3)	501 (5.5)	53 (4.1)	504 (3.2)
Florida, US r	19 (5.2)	567 (10.8)	23 (5.8)	559 (9.8)	9 (3.8)	536 (11.4)	48 (5.3)	530 (4.5)
Ontario, Canada	12 (3.2)	534 (5.3)	6 (2.0)	516 (12.9)	7 (2.1)	522 (9.6)	75 (4.0)	515 (3.6)
North Carolina, US	8 (4.7)	539 (19.6)	17 (6.2)	572 (10.6)	16 (6.1)	560 (7.9)	59 (7.2)	552 (6.8)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

About how many of the students in your school can do the following when they begin primary/elementary school?



Principals' responses across the three items were averaged and their students were assigned to categories based on a 4-point scale: Less than 25%=1, 25–50%=2, 51–75%=3, and More than 75%=4. More than 75% indicates an average greater than 3.25. 51–75% indicates an average greater than 2.5 through 3.25. 25-50% indicates an average of 1.75 through 2.5. Less than 25% indicates an average less than 1.75.

Schools Where Students Are Ready to Learn

An important element of school readiness is having students with the prerequisite skills for the curriculum for their grade—that is, students academically ready to learn. Furthermore, students who begin school with higher numeracy skills tend to maintain that advantage. For example, the Early Childhood Longitudinal Study conducted in the United States found that of students in the highest one-third in mathematics achievement in kindergarten, 67 percent also were in the highest one-third in fifth grade, and that the majority of students in the lowest one-third as kindergartners also were in the lowest one-third in fifth grade (Princiotta, Flanagan, & Hausken, 2006).

TIMSS collected information about this important issue in the fourth grade assessment by asking school principals to estimate the percentages of students entering their schools able to perform each of three early numeracy skills: count up to 100 or higher, recognize all 10 written numbers from 1 to 10, and write all 10 numbers from 1 to 10. Of course, in countries where students start school at a young age (e.g., age 4 or 5 in England, Ireland, the Netherlands, New Zealand, and Northern Ireland), students have had fewer years to develop numeracy skills prior to starting school.

Exhibit 5.7 presents the TIMSS results for the percentages of students entering school with early numeracy skills and their average mathematics achievement. The first page of the exhibit shows that 32 percent of the fourth grade students, on average, were in schools where most children (more than 75%) entered school with early numeracy skills, and a further 17 percent in schools where 51–75% have such skills. Students in these schools had higher average mathematics achievement than those in schools where fewer students entered with numeracy skills. In particular, the 35 percent in schools where few students began school with numeracy skills had the lowest average mathematics achievement.

Schools with Sufficient Facilities, Books, and Technology

Studies have shown that resources are crucial for improving schooling, perhaps even more so in developing countries than in economically developed countries, where adequate school structures and material resources can be taken for granted (Lee & Zuze, 2011). The extent and quality of school resources can have an important impact on the quality of classroom instruction.

School Resources

To provide information on the extent to which school resources are available to support mathematics instruction, TIMSS routinely asks school principals about the degree of shortages or inadequacies in general school resources (materials, supplies, heating/cooling/lighting, buildings, space, staff, and computers) as well as about resources specifically targeted to support mathematics instruction (specialized teachers, computer software, library materials, audio-visual resources, and calculators). Although "adequacy" can be relative, in each TIMSS assessment there has been a strong positive relationship between principals' perceptions of the absence of school resource shortages and average mathematics achievement.

Exhibit 5.8 presents the TIMSS 2011 results for the Mathematics Resource Shortages scale for participants in the fourth grade assessment. Students were scored according to their principals' responses concerning twelve school and classroom resources (see the second page of the exhibit for details). Countries are ordered according to the percentage of students (from most to least) in schools **Not Affected** by resource shortages. Schools in this category had principals who reported that shortages affected instruction "not at all" for six of the twelve resources and only "a little" for the other six, on average. There was substantial variation across the fourth grade countries—from 0 to 64 percent, with an average of 25 percent of students attending well-resourced schools.

Students in schools where instruction was **Affected A Lot** had principals who reported that shortages affected instruction "a lot" for six of the twelve resources and "some" for the other six, on average. Many countries were fortunate to have very few, if any, students in such poorly resourced schools. However, this was a crucial problem in some countries. At 462 points, on average, mathematics achievement for students in schools **Affected A Lot** by resource shortages was substantially lower (35 points) than for students in schools **Not Affected** by resources shortages.

Exhibit 5.9 presents the results for the Mathematics Resource Shortages scale for participants in the TIMSS 2011 eighth grade assessment. As shown on the second page of the exhibit, the eighth grade scale consisted of essentially the same twelve resources as the fourth grade. The results also were similar to the fourth grade, with wide variation across countries in the percentage of eighth grade students attending schools **Not Affected** by resource shortages (1–71%), with an international average of 25 percent. Furthermore, the average achievement gap between students attending schools where instruction was

Exhibit 5.8: Instruction Affected by Mathematics Resource Shortages

TIMSS 2011 Mathematics 4th Grade

Reported by Principals

Students were scored according to their principals' responses concerning twelve school and classroom resources on the *Mathematics Resource Shortages* scale. Students in schools where instruction was **Not Affected** by resource shortages had a score on the scale of at least 11.1, which corresponds to their principals reporting that shortages affected instruction "not at all" for six of the twelve resources and "a little" for the other six, on average. Students in schools where instruction was **Affected A Lot** had a score no higher than 6.8, which corresponds to their principals reporting that shortages affected instruction "a lot" for six of the twelve resources and "some" for the other six, on average. All other students attended schools where instruction was **Somewhat Affected** by resource shortages.

Country	Not Affected		Somewhat Affected		Affected A Lot		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Korea, Rep. of	64 (4.2)	606 (2.4)	35 (4.1)	601 (3.7)	1 (0.0)	~ ~	11.9 (0.17)
Slovenia	61 (3.7)	514 (3.1)	39 (3.7)	511 (3.1)	0 (0.0)	~ ~	11.8 (0.12)
Netherlands r	46 (4.8)	544 (3.0)	54 (4.8)	538 (2.5)	0 (0.0)	~ ~	11.1 (0.15)
Australia	44 (3.3)	529 (5.1)	54 (3.3)	507 (3.4)	1 (0.8)	~ ~	11.1 (0.14)
Spain	44 (4.8)	487 (4.5)	55 (4.8)	480 (4.3)	1 (0.8)	~ ~	10.9 (0.16)
United States	42 (2.9)	549 (3.3)	57 (2.9)	538 (3.0)	1 (0.4)	~ ~	11.0 (0.13)
England	42 (4.8)	545 (6.5)	58 (4.8)	540 (5.5)	0 (0.0)	~ ~	11.1 (0.18)
New Zealand	39 (3.9)	493 (4.5)	61 (3.9)	483 (4.0)	0 (0.0)	~ ~	10.9 (0.12)
Czech Republic	38 (4.1)	505 (4.5)	60 (4.3)	514 (3.0)	2 (1.1)	~ ~	10.8 (0.12)
Singapore	37 (0.0)	603 (4.7)	56 (0.0)	608 (4.4)	7 (0.0)	598 (13.1)	10.5 (0.00)
Poland	36 (3.8)	486 (4.2)	64 (3.8)	479 (2.8)	0 (0.0)	~ ~	10.9 (0.15)
Belgium (Flemish)	34 (4.3)	552 (3.7)	66 (4.3)	549 (2.0)	0 (0.0)	~ ~	10.8 (0.14)
Croatia	34 (4.6)	487 (4.9)	64 (4.5)	491 (2.5)	2 (1.2)	~ ~	10.5 (0.16)
Austria	34 (4.5)	511 (4.1)	66 (4.5)	507 (3.3)	0 (0.0)	~ ~	10.5 (0.15)
Kazakhstan	33 (3.9)	499 (7.9)	60 (4.0)	499 (6.1)	7 (2.1)	533 (23.0)	10.1 (0.22)
Qatar	31 (2.8)	447 (8.9)	43 (3.3)	409 (6.2)	27 (3.0)	387 (7.7)	9.2 (0.24)
Armenia	30 (4.2)	464 (6.9)	70 (4.2)	447 (4.3)	0 (0.0)	~ ~	10.5 (0.12)
Georgia	30 (4.0)	453 (8.6)	70 (4.0)	449 (4.8)	0 (0.0)	~ ~	10.5 (0.13)
United Arab Emirates	30 (2.0)	460 (5.0)	61 (2.4)	422 (3.1)	9 (1.3)	428 (9.2)	9.7 (0.09)
Hungary	29 (3.6)	528 (6.6)	69 (3.8)	511 (4.6)	2 (1.2)	~ ~	10.5 (0.17)
Northern Ireland	29 (4.5)	568 (6.4)	70 (4.6)	561 (4.3)	1 (1.0)	~ ~	10.6 (0.17)
Sweden	28 (3.9)	512 (5.0)	72 (3.9)	500 (2.5)	0 (0.0)	~ ~	10.5 (0.14)
Germany	28 (2.9)	534 (4.1)	71 (3.0)	526 (2.7)	1 (0.0)	~ ~	10.5 (0.09)
Norway	28 (4.4)	486 (4.9)	72 (4.4)	498 (3.7)	0 (0.0)	~ ~	10.5 (0.11)
Japan	28 (3.7)	584 (2.9)	71 (3.9)	587 (2.3)	2 (1.1)	~ ~	10.4 (0.13)
Russian Federation	25 (3.4)	554 (5.3)	70 (3.5)	535 (4.8)	4 (1.5)	540 (13.7)	10.0 (0.15)
Malta	25 (0.1)	503 (2.0)	71 (0.1)	493 (1.7)	4 (0.0)	511 (8.4)	10.2 (0.00)
Finland	24 (3.3)	553 (3.0)	74 (3.3)	543 (3.0)	2 (1.2)	~ ~	10.2 (0.14)
Ireland	24 (3.9)	534 (5.9)	74 (4.0)	526 (3.5)	1 (1.0)	~ ~	10.4 (0.15)
Lithuania	23 (3.7)	534 (6.2)	77 (3.7)	534 (2.9)	0 (0.0)	~ ~	10.2 (0.12)
Serbia	21 (3.5)	528 (7.9)	73 (4.1)	516 (3.5)	7 (2.5)	481 (17.6)	9.6 (0.15)
Chile	18 (2.5)	506 (8.7)	77 (3.2)	455 (3.3)	5 (1.8)	443 (12.2)	9.6 (0.15)
Romania	16 (3.6)	492 (23.1)	81 (3.8)	479 (5.7)	2 (1.3)	~ ~	9.6 (0.14)
Bahrain	16 (4.6)	469 (7.2)	71 (4.9)	425 (4.6)	13 (3.2)	451 (12.0)	9.2 (0.35)
Slovak Republic	15 (2.3)	510 (6.2)	85 (2.3)	505 (4.1)	0 (0.0)	~ ~	9.9 (0.09)
Denmark r	14 (2.6)	538 (5.8)	85 (2.8)	539 (2.9)	2 (1.1)	~ ~	9.8 (0.09)
Yemen	14 (3.1)	238 (12.7)	83 (3.4)	247 (6.8)	3 (1.5)	336 (23.0)	10.0 (0.12)
Morocco	12 (2.5)	339 (10.6)	83 (2.8)	332 (5.3)	5 (1.2)	392 (12.7)	9.9 (0.09)
Tunisia	12 (2.4)	367 (10.0)	86 (2.5)	358 (4.1)	2 (1.1)	~ ~	9.9 (0.09)
Portugal	12 (2.3)	540 (9.3)	87 (2.5)	531 (4.0)	1 (0.7)	~ ~	9.5 (0.14)
Italy	12 (2.2)	517 (7.8)	88 (2.2)	507 (2.6)	0 (0.4)	~ ~	9.7 (0.09)
Kuwait	9 (2.6)	323 (10.9)	65 (4.1)	346 (3.7)	26 (3.7)	340 (8.5)	8.2 (0.19)
Chinese Taipei	9 (2.3)	603 (6.2)	81 (3.2)	590 (2.3)	10 (2.6)	596 (6.5)	8.7 (0.14)
Saudi Arabia	8 (2.6)	417 (11.5)	84 (2.6)	410 (6.1)	7 (2.0)	414 (20.0)	9.1 (0.14)
Oman r	7 (1.6)	384 (11.2)	82 (2.0)	376 (3.2)	11 (1.6)	391 (10.0)	8.5 (0.09)
Thailand	5 (1.9)	511 (15.8)	75 (4.2)	457 (4.6)	20 (3.8)	448 (14.4)	8.3 (0.14)
Iran, Islamic Rep. of	4 (1.8)	446 (25.1)	82 (3.9)	429 (4.2)	14 (3.5)	429 (10.3)	8.4 (0.12)
Turkey	2 (1.0)	~ ~	83 (2.1)	465 (5.2)	15 (1.9)	472 (8.2)	8.0 (0.07)
Azerbaijan	1 (0.9)	~ ~	88 (3.0)	460 (6.6)	10 (3.0)	491 (14.4)	8.5 (0.13)
Hong Kong SAR	0 (0.0)	~ ~	94 (2.1)	604 (3.7)	6 (2.1)	567 (36.6)	8.2 (0.07)
International Avg.	25 (0.5)	497 (1.2)	70 (0.5)	488 (0.6)	5 (0.2)	462 (3.5)	

Centerpoint of scale set at 10.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 5.8: Instruction Affected by Mathematics Resource Shortages (Continued)

TIMSS 2011 Mathematics 4th Grade

Country	Not Affected		Somewhat Affected		Affected A Lot		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Sixth Grade Participants							
Honduras	20 (4.1)	413 (16.8)	66 (4.5)	396 (5.7)	14 (3.3)	371 (11.6)	9.3 (0.23)
Yemen	12 (2.5)	323 (15.2)	85 (2.8)	349 (6.0)	3 (1.5)	386 (12.2)	9.8 (0.12)
Botswana	2 (1.0)	~ ~	90 (2.5)	416 (3.8)	8 (2.3)	431 (27.5)	8.7 (0.12)
Benchmarking Participants							
Dubai, UAE	48 (0.4)	491 (3.1)	43 (0.4)	454 (2.2)	9 (0.1)	437 (6.6)	10.6 (0.02)
Alberta, Canada	41 (4.2)	505 (3.7)	59 (4.2)	509 (3.2)	0 (0.0)	~ ~	11.1 (0.16)
Quebec, Canada	40 (4.6)	537 (3.2)	59 (4.6)	530 (3.2)	1 (0.7)	~ ~	10.8 (0.16)
Florida, US r	38 (6.3)	544 (3.8)	62 (6.3)	544 (4.9)	0 (0.0)	~ ~	11.0 (0.24)
North Carolina, US r	37 (7.3)	555 (8.2)	57 (8.1)	553 (6.3)	6 (4.1)	555 (16.8)	10.8 (0.38)
Ontario, Canada	26 (4.1)	515 (5.6)	72 (4.1)	519 (3.7)	1 (0.9)	~ ~	10.4 (0.14)
Abu Dhabi, UAE	25 (3.9)	442 (11.5)	63 (4.7)	402 (6.0)	12 (2.9)	419 (11.7)	9.3 (0.20)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

How much is your school's capacity to provide instruction affected by a shortage or inadequacy of the following?

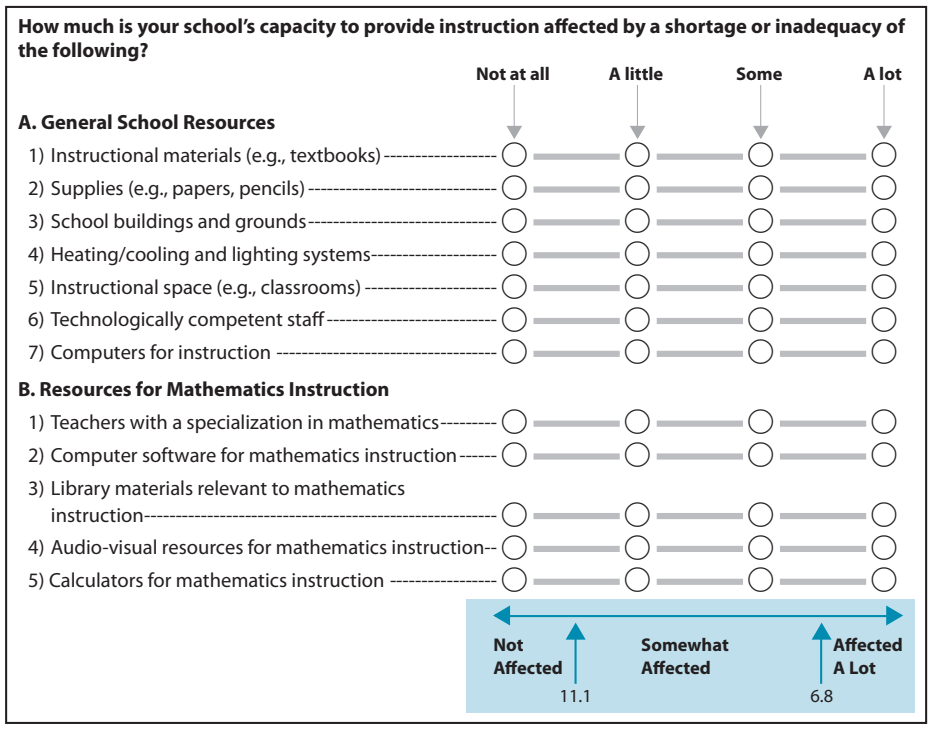


Exhibit 5.9: Instruction Affected by Mathematics Resource Shortages

TIMSS 2011 Mathematics 8th Grade

Reported by Principals

Students were scored according to their principals' responses concerning twelve school and classroom resources on the *Mathematics Resource Shortages* scale. Students in schools where instruction was **Not Affected** by resource shortages had a score on the scale of at least 11.1, which corresponds to their principals reporting that shortages affected instruction "not at all" for six of the twelve resources and "a little" for the other six, on average. Students in schools where instruction was **Affected A Lot** had a score no higher than 7.3, which corresponds to their principals reporting that shortages affected instruction "a lot" for six of the twelve resources and "some" for the other six, on average. All other students attended schools where instruction was **Somewhat Affected** by resource shortages.

Country	Not Affected		Somewhat Affected		Affected A Lot		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Slovenia	71 (3.9)	505 (2.8)	29 (3.9)	506 (3.2)	0 (0.0)	~ ~	11.9 (0.13)
Singapore	67 (0.0)	614 (4.5)	22 (0.0)	594 (7.4)	11 (0.0)	625 (11.4)	11.7 (0.00)
Korea, Rep. of	58 (4.2)	615 (3.2)	40 (4.3)	608 (4.9)	2 (1.1)	~ ~	11.6 (0.17)
Australia	51 (3.5)	525 (8.6)	46 (3.2)	489 (5.7)	3 (1.5)	516 (15.5)	11.1 (0.16)
Norway	48 (4.5)	474 (3.6)	52 (4.5)	475 (3.1)	0 (0.0)	~ ~	11.1 (0.10)
England	48 (4.2)	498 (8.1)	52 (4.2)	516 (8.2)	0 (0.0)	~ ~	11.3 (0.16)
New Zealand	44 (4.3)	498 (8.8)	53 (4.4)	481 (7.2)	3 (1.9)	470 (13.3)	11.3 (0.17)
Sweden r	43 (4.9)	490 (2.9)	57 (4.9)	482 (3.4)	0 (0.2)	~ ~	10.9 (0.12)
United States	43 (2.6)	520 (4.7)	55 (2.7)	502 (3.9)	2 (0.7)	~ ~	11.0 (0.10)
Hong Kong SAR	41 (4.4)	605 (7.8)	54 (4.8)	573 (7.3)	6 (2.3)	553 (32.6)	10.9 (0.19)
Japan	38 (4.4)	581 (5.1)	62 (4.4)	563 (3.0)	0 (0.0)	~ ~	10.9 (0.14)
Finland	36 (4.5)	519 (3.4)	63 (4.6)	510 (3.0)	1 (0.6)	~ ~	10.8 (0.10)
Qatar	35 (0.9)	422 (7.4)	28 (0.2)	444 (3.7)	37 (0.8)	367 (4.2)	9.1 (0.06)
Chinese Taipei	33 (4.1)	610 (8.0)	65 (4.0)	609 (4.2)	3 (1.3)	608 (15.0)	10.5 (0.16)
Hungary	32 (3.8)	510 (6.5)	66 (3.8)	502 (5.2)	2 (1.1)	~ ~	10.5 (0.14)
Armenia	30 (3.6)	474 (7.3)	70 (3.6)	464 (3.9)	0 (0.0)	~ ~	10.6 (0.11)
United Arab Emirates	29 (2.1)	481 (4.1)	57 (2.4)	445 (3.7)	14 (1.6)	442 (6.2)	9.7 (0.09)
Kazakhstan	27 (3.3)	499 (7.1)	63 (3.9)	484 (5.4)	9 (2.6)	470 (17.5)	10.1 (0.20)
Israel	25 (3.8)	548 (8.8)	64 (4.3)	518 (5.6)	11 (2.4)	447 (13.8)	9.8 (0.18)
Russian Federation	25 (3.5)	548 (8.2)	71 (3.6)	537 (3.8)	4 (1.4)	524 (10.9)	10.1 (0.13)
Lithuania	22 (3.7)	509 (7.0)	78 (3.7)	500 (3.4)	0 (0.0)	~ ~	10.3 (0.10)
Georgia	21 (2.9)	450 (10.5)	76 (3.1)	426 (3.9)	3 (1.4)	438 (17.9)	10.2 (0.11)
Lebanon	20 (3.1)	494 (9.3)	71 (3.6)	435 (4.0)	9 (2.5)	466 (11.0)	9.7 (0.17)
Chile	18 (2.7)	464 (7.1)	79 (3.0)	406 (3.6)	2 (1.2)	~ ~	9.8 (0.11)
Malaysia	16 (3.0)	469 (13.3)	69 (3.7)	436 (5.6)	15 (2.6)	427 (16.3)	9.4 (0.15)
Romania	15 (3.1)	483 (15.7)	83 (3.4)	454 (4.7)	2 (1.4)	~ ~	9.9 (0.13)
Italy	13 (2.1)	513 (5.6)	86 (2.2)	496 (2.9)	1 (0.0)	~ ~	10.0 (0.07)
Bahrain	12 (0.1)	493 (7.5)	80 (0.2)	398 (2.0)	7 (0.2)	390 (6.0)	9.5 (0.01)
Oman	11 (1.5)	398 (9.7)	77 (2.6)	361 (3.6)	12 (2.2)	367 (8.6)	9.0 (0.09)
Jordan	10 (2.1)	423 (12.9)	78 (3.1)	402 (4.3)	12 (2.4)	419 (13.5)	9.1 (0.11)
Ghana	10 (2.4)	313 (12.2)	88 (2.6)	332 (4.7)	2 (1.4)	~ ~	9.9 (0.09)
Saudi Arabia	8 (2.2)	383 (16.0)	87 (2.6)	394 (5.0)	4 (1.7)	406 (13.4)	9.3 (0.12)
Macedonia, Rep. of	7 (2.3)	476 (16.9)	86 (2.2)	423 (6.0)	7 (1.8)	431 (23.3)	9.4 (0.11)
Thailand	6 (2.0)	440 (17.9)	74 (3.8)	429 (5.3)	20 (3.3)	416 (9.4)	8.5 (0.12)
Palestinian Nat'l Auth.	5 (1.6)	408 (6.1)	90 (2.4)	403 (3.9)	5 (1.8)	425 (15.3)	9.0 (0.09)
Tunisia	4 (1.7)	409 (7.0)	94 (1.9)	425 (2.9)	1 (0.8)	~ ~	9.6 (0.07)
Morocco	4 (1.0)	435 (17.4)	94 (1.2)	366 (2.1)	2 (0.6)	~ ~	9.6 (0.06)
Indonesia	3 (2.7)	306 (23.2)	87 (3.1)	385 (3.9)	10 (2.6)	418 (14.1)	8.9 (0.12)
Turkey	3 (1.0)	609 (50.3)	82 (2.6)	448 (4.1)	16 (2.4)	447 (8.9)	8.4 (0.09)
Iran, Islamic Rep. of	3 (1.0)	505 (40.5)	88 (2.3)	415 (4.5)	9 (2.0)	393 (11.9)	8.8 (0.09)
Syrian Arab Republic	2 (1.1)	~ ~	93 (2.1)	379 (4.7)	5 (2.0)	376 (14.0)	9.2 (0.08)
Ukraine	1 (1.1)	~ ~	77 (3.6)	477 (4.4)	21 (3.5)	486 (9.4)	8.3 (0.11)
International Avg.	25 (0.5)	488 (2.2)	69 (0.5)	464 (0.7)	6 (0.3)	453 (2.9)	

Centerpoint of scale set at 10.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students.

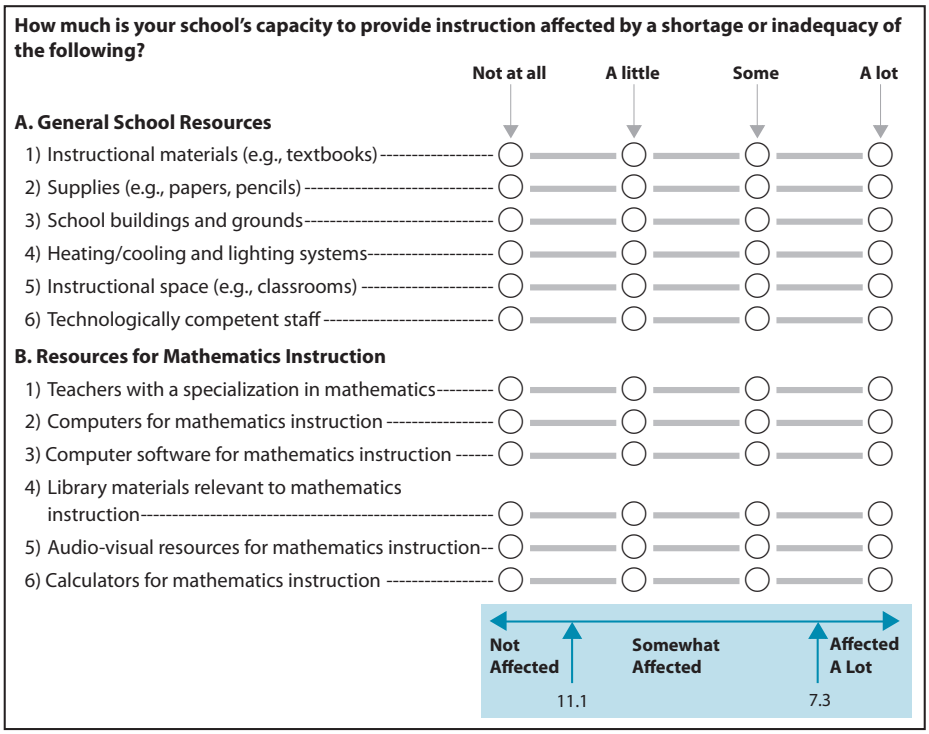
SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 5.9: Instruction Affected by Mathematics Resource Shortages (Continued)

TIMSS 2011 Mathematics 8th Grade

Country	Not Affected		Somewhat Affected		Affected A Lot		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Ninth Grade Participants							
Honduras	13 (2.4)	376 (16.8)	78 (3.2)	333 (3.6)	9 (2.3)	315 (8.2)	9.2 (0.13)
South Africa	5 (0.9)	510 (15.2)	85 (2.2)	342 (3.0)	10 (2.1)	350 (7.7)	9.3 (0.09)
Botswana	1 (0.7)	~ ~	96 (1.7)	395 (2.7)	3 (1.6)	417 (22.0)	8.9 (0.08)
Benchmarking Participants							
Quebec, Canada	66 (3.6)	534 (3.2)	34 (3.6)	527 (4.4)	0 (0.0)	~ ~	11.8 (0.14)
Connecticut, US	59 (7.4)	530 (8.7)	39 (7.1)	504 (12.9)	2 (1.8)	~ ~	11.5 (0.27)
Indiana, US r	58 (7.8)	518 (8.9)	42 (7.8)	531 (7.8)	0 (0.0)	~ ~	11.6 (0.26)
Florida, US	51 (8.3)	509 (10.9)	46 (8.2)	520 (11.3)	3 (2.4)	462 (23.5)	11.4 (0.35)
Massachusetts, US	49 (7.2)	571 (8.8)	50 (7.0)	551 (9.4)	1 (0.1)	~ ~	11.1 (0.27)
Dubai, UAE	44 (0.5)	499 (3.9)	41 (0.4)	461 (2.2)	15 (0.3)	460 (6.2)	10.4 (0.03)
Minnesota, US	44 (7.3)	551 (7.4)	56 (7.3)	541 (7.6)	0 (0.0)	~ ~	11.2 (0.28)
Alberta, Canada	43 (4.1)	513 (4.1)	54 (3.9)	500 (3.2)	3 (1.7)	499 (20.2)	10.9 (0.14)
California, US r	38 (6.4)	493 (9.9)	61 (6.6)	488 (7.3)	2 (0.1)	~ ~	10.8 (0.23)
Ontario, Canada	34 (4.4)	520 (4.2)	64 (4.5)	507 (3.3)	1 (0.0)	~ ~	10.8 (0.15)
Alabama, US r	33 (6.6)	487 (15.9)	65 (7.1)	459 (7.4)	2 (2.3)	~ ~	11.0 (0.25)
Colorado, US	22 (5.7)	535 (13.2)	76 (6.0)	513 (6.6)	2 (0.1)	~ ~	10.3 (0.25)
Abu Dhabi, UAE	22 (3.6)	485 (10.9)	61 (4.3)	439 (6.1)	17 (2.9)	438 (7.5)	9.2 (0.17)
North Carolina, US	22 (6.6)	517 (17.0)	76 (6.8)	541 (8.6)	2 (1.8)	~ ~	10.4 (0.30)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011



Not Affected by resource shortages and those attending schools where it was **Affected A Lot** was 35 points for eighth grade, the same as for the fourth grade.

Teacher Working Conditions

There is evidence that, in some countries, teacher shortages may exist partly as a result of poor working conditions. For example, a review of research from the United States suggests that teachers who leave the profession after just a few years are more likely to leave because of poor working conditions than because of low pay (Johnson, 2006). Although teachers' reports across countries are related to their expectations and need to be considered in the context of variations in economic situations, TIMSS 2011 asked the students' teachers to provide their views on the adequacy of their working conditions. More specifically, teachers were asked about five potential problem areas:

- The school building needing significant repair;
- Classrooms being overcrowded;
- Teachers having too many teaching hours;
- Teachers not having adequate workspace; and
- Teachers not having adequate instructional materials and supplies.

Exhibit 5.10 presents the results for the TIMSS 2011 fourth grade assessment for the Teacher Working Conditions scale. Countries are ordered by the percentage of students whose teachers reported few problems with their working conditions. Teachers with **Hardly Any Problems** with their working conditions reported "not a problem" for three of the five areas and only "minor problems" for the other two, on average. There was a range of results across the fourth grade countries—from 4 to 49 percent, with an average of 26 percent of students in schools where teachers had **Hardly Any Problems**.

For this scale, the remaining two categories were **Minor Problems** and **Moderate Problems**. Teachers with **Moderate Problems** reported "moderate problem" for three of five conditions and "minor problem" for the other two, on average. About half of the students, on average, across the fourth grade countries were in schools where teachers had **Minor Problems** and about one-fourth were in schools with **Moderate Problems**. Students whose teachers reported **Moderate Problems** had somewhat lower mathematics achievement, on average, than those whose teachers reported **Minor Problems**, and those

students in turn had lower achievement than students whose teachers reported **Hardly Any Problems** (487, 491, and 498, respectively). In general, the results for the sixth grade and benchmarking participants followed the same pattern, with agreement between teacher reports and higher achievement for students in better school conditions. However, substantial percentages of students (45–59%) in the sixth grade countries had teachers reporting **Moderate Problems** with school conditions. Exhibit 5.11 presents the results for the Teacher Working Conditions scale for the TIMSS 2011 eighth grade assessment. The eighth grade scale was based on responses by the students' mathematics teachers to statements about the same five problem areas as the fourth grade. Eighth grade mathematics teachers expressed about the same level of satisfaction with working conditions as fourth grade teachers, with 21 percent of students in schools whose teachers reported **Hardly Any Problems** and 31 percent in schools with **Moderate Problems**. The average mathematics achievement difference between these two groups of students was 15 points (479 vs. 464).

Difficulties Filling Vacancies for Mathematics Teachers

Recent research suggests that mathematics teachers are in relatively short supply in some countries, and that the impending retirement of aging teachers will further contribute to this shortage (Ingersoll & Perda, 2010). TIMSS Advanced 2008 noted that, in several countries, not only were teachers of advanced mathematics nearing retirement age, but relatively few students were considering mathematics as a career option (Mullis, Martin, Robitaille, & Foy, 2009).

Exhibit 5.12 summarizes school principals' reports from the TIMSS 2011 eighth grade assessment about difficulties in filling vacancies for mathematics teachers. In most countries, on average, eighth grade students were in schools where principals reported that there were no vacancies (58%) or that vacancies were easy to fill (23%). Average mathematics achievement was the same for these two groups of students (468). However, average achievement was somewhat lower among the 15 percent of students in schools where vacancies were somewhat difficult to fill (458), and especially among the 4 percent in schools where vacancies were very difficult to fill (433).

Exhibit 5.10: Teacher Working Conditions

TIMSS 2011 4th Grade Mathematics

Reported by Teachers

Students were scored according to their teachers' responses concerning five potential problem areas on the *Teacher Working Conditions* scale. Students whose teachers had **Hardly Any Problems** with their working conditions had a score on the scale of at least 11.3, which corresponds to their teachers reporting "not a problem" for three of five areas and "minor problem" for the other two, on average. Students whose teachers had **Moderate Problems** had a score no higher than 8.7, which corresponds to their teachers reporting "moderate problem" for three of five conditions and "minor problem" for the other two, on average. All other students had teachers that reported **Minor Problems** with their working conditions.

Country	Hardly Any Problems		Minor Problems		Moderate Problems		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Poland	49 (3.6)	474 (2.8)	44 (3.5)	488 (3.1)	7 (1.5)	483 (7.7)	11.2 (0.13)
United States r	49 (2.5)	547 (2.8)	41 (2.3)	544 (2.8)	10 (1.6)	517 (6.8)	11.1 (0.10)
United Arab Emirates	46 (2.6)	441 (4.5)	38 (2.4)	436 (4.2)	15 (1.6)	412 (6.0)	10.9 (0.11)
Qatar	46 (3.9)	414 (7.3)	41 (3.6)	404 (6.7)	13 (2.1)	426 (11.1)	10.8 (0.17)
Czech Republic	45 (4.2)	510 (4.2)	46 (4.1)	511 (3.2)	9 (2.3)	513 (4.7)	11.0 (0.15)
Australia r	44 (4.2)	531 (6.2)	37 (4.1)	513 (5.2)	19 (2.7)	505 (8.4)	10.9 (0.19)
England	40 (4.3)	541 (5.7)	51 (4.6)	548 (5.7)	9 (2.4)	540 (11.6)	10.9 (0.14)
New Zealand	40 (3.1)	488 (4.8)	45 (3.0)	488 (3.7)	15 (2.3)	477 (6.7)	10.7 (0.13)
Ireland	38 (4.0)	533 (4.8)	47 (3.8)	522 (3.9)	15 (2.5)	531 (7.5)	10.8 (0.17)
Belgium (Flemish)	37 (3.6)	551 (2.4)	47 (3.9)	551 (2.6)	16 (2.8)	540 (7.3)	10.6 (0.14)
Kuwait	37 (4.1)	340 (6.0)	47 (3.9)	343 (5.1)	16 (3.0)	341 (10.5)	10.6 (0.16)
Slovak Republic	36 (3.4)	505 (6.4)	52 (3.2)	503 (5.2)	12 (2.2)	528 (6.5)	10.6 (0.12)
Northern Ireland r	35 (4.8)	567 (5.4)	49 (4.3)	564 (5.0)	16 (3.5)	553 (8.4)	10.7 (0.19)
Chile	35 (4.2)	484 (5.8)	38 (3.9)	453 (5.8)	27 (3.5)	447 (6.5)	10.2 (0.17)
Spain	32 (3.8)	485 (5.3)	46 (4.1)	484 (4.3)	22 (3.1)	477 (4.3)	10.3 (0.13)
Bahrain	32 (3.4)	460 (6.9)	42 (3.6)	424 (5.8)	26 (3.4)	426 (5.5)	10.1 (0.14)
Hungary	32 (3.2)	501 (7.9)	49 (3.1)	519 (5.2)	19 (2.9)	525 (6.9)	10.4 (0.15)
Lithuania	30 (3.2)	529 (4.8)	59 (3.3)	535 (3.3)	11 (2.0)	535 (4.1)	10.4 (0.11)
Austria	30 (3.5)	514 (3.5)	46 (3.8)	511 (3.4)	25 (3.7)	498 (5.4)	10.3 (0.18)
Singapore	29 (2.4)	611 (5.9)	53 (2.5)	602 (4.7)	18 (2.0)	607 (8.1)	10.4 (0.10)
Netherlands r	29 (4.3)	539 (4.4)	53 (5.0)	540 (3.1)	18 (3.7)	534 (5.3)	10.3 (0.17)
Kazakhstan	29 (3.8)	508 (9.5)	44 (3.9)	506 (7.8)	27 (3.7)	489 (8.4)	10.0 (0.19)
Slovenia	28 (3.6)	515 (3.9)	45 (4.0)	515 (3.2)	27 (3.2)	507 (3.9)	10.0 (0.14)
Croatia	27 (3.0)	485 (4.3)	51 (3.5)	493 (2.7)	21 (3.0)	491 (4.0)	10.2 (0.14)
Thailand	27 (4.0)	465 (6.5)	50 (4.3)	459 (6.0)	23 (3.8)	454 (14.4)	10.2 (0.16)
Georgia	26 (3.3)	457 (8.0)	52 (4.1)	442 (5.1)	22 (3.1)	464 (9.2)	10.0 (0.14)
Romania	26 (3.4)	484 (10.2)	44 (4.2)	481 (7.3)	30 (3.6)	478 (11.1)	9.9 (0.15)
Russian Federation	24 (3.0)	543 (7.0)	54 (4.0)	542 (4.6)	22 (2.9)	539 (6.3)	10.0 (0.12)
Saudi Arabia	23 (3.4)	423 (7.5)	42 (4.3)	407 (8.0)	34 (4.2)	406 (10.7)	9.7 (0.18)
Malta	21 (0.1)	501 (2.3)	56 (0.1)	498 (1.9)	24 (0.1)	487 (2.7)	9.9 (0.00)
Italy	20 (2.7)	520 (4.5)	46 (3.5)	508 (4.1)	34 (3.7)	504 (4.8)	9.7 (0.11)
Finland	20 (3.0)	548 (4.3)	63 (4.3)	545 (2.8)	17 (3.5)	548 (5.1)	10.1 (0.13)
Azerbaijan	19 (3.0)	477 (13.8)	51 (3.7)	467 (7.7)	30 (3.3)	449 (8.3)	9.8 (0.14)
Chinese Taipei	19 (3.1)	588 (4.1)	59 (4.1)	595 (2.9)	23 (3.4)	585 (4.9)	10.1 (0.15)
Turkey	18 (2.3)	499 (8.3)	43 (3.0)	478 (7.2)	39 (3.1)	446 (8.6)	9.4 (0.13)
Iran, Islamic Rep. of	18 (2.4)	449 (9.0)	51 (4.2)	429 (5.4)	31 (4.3)	424 (7.8)	9.7 (0.15)
Hong Kong SAR	17 (3.6)	597 (13.1)	50 (4.5)	601 (4.4)	33 (4.3)	607 (5.4)	9.5 (0.15)
Oman	17 (1.7)	412 (4.5)	44 (3.2)	387 (4.2)	40 (3.1)	371 (5.0)	9.4 (0.08)
Japan	16 (3.2)	591 (4.5)	44 (3.7)	584 (2.9)	40 (3.4)	586 (3.0)	9.3 (0.14)
Serbia	16 (3.1)	513 (6.0)	48 (3.9)	515 (4.7)	36 (3.8)	518 (4.4)	9.5 (0.13)
Portugal	16 (4.7)	526 (14.9)	46 (4.9)	537 (5.3)	38 (4.8)	530 (4.6)	9.3 (0.26)
Armenia	16 (2.5)	445 (10.7)	49 (3.6)	454 (5.4)	35 (3.7)	455 (5.2)	9.5 (0.11)
Denmark	16 (2.5)	543 (5.3)	57 (3.8)	544 (3.6)	27 (3.8)	532 (4.5)	9.6 (0.10)
Norway	15 (3.2)	501 (5.8)	51 (4.8)	491 (3.9)	34 (5.0)	497 (5.6)	9.5 (0.17)
Korea, Rep. of	14 (3.1)	603 (4.6)	49 (4.1)	605 (3.0)	36 (4.3)	606 (3.6)	9.4 (0.14)
Germany	14 (2.2)	527 (6.9)	50 (3.5)	531 (2.6)	36 (3.3)	525 (3.8)	9.4 (0.12)
Yemen	10 (2.9)	280 (19.3)	47 (4.1)	232 (7.7)	43 (4.4)	255 (10.3)	9.0 (0.14)
Sweden r	9 (2.6)	503 (6.3)	49 (4.1)	508 (3.1)	42 (4.3)	501 (4.1)	9.1 (0.15)
Morocco	6 (1.2)	421 (13.5)	16 (2.3)	363 (12.3)	78 (2.5)	327 (5.3)	7.6 (0.19)
Tunisia	4 (1.0)	397 (13.3)	30 (3.3)	361 (6.7)	67 (3.4)	356 (5.0)	7.9 (0.15)
International Avg.	26 (0.5)	498 (1.1)	47 (0.5)	491 (0.7)	27 (0.5)	487 (1.0)	

Centerpoint of scale set at 10.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 5.10: Teacher Working Conditions (Continued)

TIMSS 2011 Mathematics 4th Grade

Country	Hardly Any Problems		Minor Problems		Moderate Problems		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Sixth Grade Participants							
Honduras	15 (3.1)	442 (16.9)	40 (4.5)	399 (6.9)	45 (4.4)	377 (8.0)	9.3 (0.17)
Botswana	7 (1.7)	478 (28.4)	34 (4.1)	422 (8.8)	59 (4.1)	413 (4.3)	8.5 (0.15)
Yemen	6 (2.2)	340 (27.1)	48 (4.3)	350 (7.6)	46 (4.2)	347 (7.8)	8.8 (0.13)
Benchmarking Participants							
Florida, US r	64 (5.5)	544 (4.6)	31 (5.5)	546 (7.9)	6 (2.5)	528 (9.6)	11.8 (0.20)
Abu Dhabi, UAE	50 (4.5)	423 (8.3)	32 (3.9)	415 (10.0)	18 (3.3)	409 (9.6)	10.9 (0.21)
Dubai, UAE r	49 (2.8)	483 (5.0)	42 (3.1)	467 (5.0)	9 (2.0)	414 (14.9)	11.1 (0.14)
Alberta, Canada r	42 (4.5)	507 (5.4)	47 (4.3)	509 (3.0)	12 (2.8)	500 (5.9)	10.7 (0.16)
Ontario, Canada	39 (4.0)	516 (4.1)	54 (4.2)	522 (4.2)	8 (2.2)	520 (7.4)	10.8 (0.13)
North Carolina, US	35 (6.5)	549 (7.8)	57 (6.7)	552 (4.9)	8 (1.9)	577 (13.4)	10.6 (0.23)
Quebec, Canada	33 (4.5)	540 (4.6)	49 (4.6)	529 (2.4)	17 (3.8)	530 (6.6)	10.5 (0.16)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

In your current school, how severe is each problem?

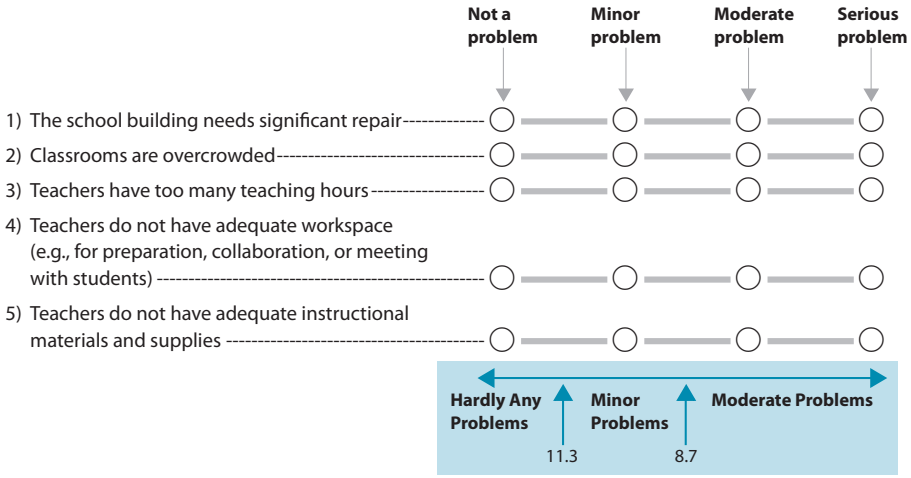


Exhibit 5.11: Teacher Working Conditions

TIMSS 2011 8th Grade Mathematics

Reported by Teachers

Students were scored according to their teachers' responses concerning five potential problem areas on the *Teacher Working Conditions* scale. Students whose teachers had **Hardly Any Problems** with their working conditions had a score on the scale of at least 11.7, which corresponds to their teachers reporting "not a problem" for three of five areas and "minor problem" for the other two, on average. Students whose teachers had **Moderate Problems** had a score no higher than 8.9, which corresponds to their teachers reporting "moderate problem" for three of five conditions and "minor problem" for the other two, on average. All other students had teachers that reported **Minor Problems** with their working conditions.

Country	Hardly Any Problems		Minor Problems		Moderate Problems		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
United States r	48 (2.6)	515 (5.0)	41 (2.4)	511 (4.4)	10 (1.6)	497 (8.3)	11.6 (0.11)
Qatar	47 (4.3)	410 (8.8)	41 (4.5)	408 (8.0)	11 (2.2)	409 (5.8)	11.3 (0.18)
United Arab Emirates	36 (2.2)	470 (4.3)	44 (2.3)	445 (3.4)	20 (2.0)	450 (6.0)	10.8 (0.11)
New Zealand	34 (4.0)	490 (8.6)	49 (3.9)	487 (8.5)	17 (2.6)	476 (11.4)	10.9 (0.18)
Lebanon	33 (4.2)	470 (6.4)	53 (4.2)	440 (5.2)	14 (3.0)	439 (9.2)	10.8 (0.20)
Australia r	32 (4.0)	510 (7.7)	51 (3.7)	511 (8.2)	16 (3.1)	489 (12.7)	10.9 (0.20)
Lithuania	32 (3.2)	493 (5.2)	56 (3.5)	506 (4.2)	12 (2.4)	510 (6.0)	10.8 (0.13)
Slovenia	31 (3.1)	504 (3.4)	43 (2.9)	502 (3.2)	26 (2.5)	510 (3.7)	10.5 (0.14)
England	30 (4.4)	500 (8.2)	55 (4.4)	516 (8.5)	14 (2.9)	479 (13.7)	10.9 (0.18)
Hungary	30 (3.4)	496 (6.3)	50 (3.4)	498 (5.8)	20 (2.8)	532 (6.4)	10.5 (0.13)
Singapore	28 (2.0)	630 (7.3)	54 (3.0)	606 (5.6)	18 (2.0)	598 (8.9)	10.7 (0.08)
Italy	26 (3.2)	501 (4.7)	54 (4.0)	499 (4.0)	19 (3.0)	497 (6.9)	10.4 (0.12)
Bahrain	25 (1.6)	460 (5.0)	44 (2.5)	392 (2.8)	31 (1.9)	396 (3.9)	10.1 (0.09)
Russian Federation	24 (2.4)	544 (8.5)	54 (3.5)	535 (4.7)	22 (3.2)	540 (8.3)	10.4 (0.10)
Romania	24 (3.0)	467 (9.8)	54 (3.6)	452 (5.8)	22 (2.9)	462 (7.4)	10.4 (0.13)
Georgia	22 (3.2)	420 (11.7)	57 (3.6)	428 (5.0)	21 (3.2)	455 (7.7)	10.3 (0.14)
Japan	22 (3.5)	571 (8.0)	40 (4.3)	575 (5.3)	38 (4.2)	563 (4.3)	9.8 (0.18)
Chinese Taipei	21 (3.4)	609 (10.9)	53 (3.7)	602 (4.4)	26 (3.5)	625 (7.7)	10.3 (0.15)
Kazakhstan	21 (3.3)	501 (9.2)	44 (4.0)	485 (6.6)	35 (3.9)	480 (7.4)	10.0 (0.18)
Ukraine	21 (3.6)	470 (9.6)	60 (4.2)	483 (5.0)	19 (3.5)	479 (10.3)	10.4 (0.14)
Chile	19 (2.7)	427 (8.8)	51 (3.6)	422 (4.8)	30 (3.5)	402 (6.0)	10.1 (0.16)
Macedonia, Rep. of r	19 (3.2)	434 (16.5)	47 (4.0)	425 (8.4)	33 (4.1)	416 (11.0)	10.0 (0.14)
Iran, Islamic Rep. of	17 (2.5)	434 (11.3)	50 (3.9)	412 (6.4)	32 (3.5)	410 (7.3)	10.0 (0.13)
Israel	17 (2.8)	498 (12.3)	44 (3.0)	512 (6.5)	38 (2.9)	537 (6.6)	9.7 (0.15)
Finland	17 (2.8)	518 (5.3)	63 (3.5)	514 (3.1)	20 (2.8)	512 (4.3)	10.2 (0.10)
Thailand	16 (2.9)	430 (11.5)	60 (3.7)	428 (6.6)	24 (3.2)	421 (6.5)	10.2 (0.13)
Hong Kong SAR	15 (3.5)	591 (14.6)	62 (4.5)	585 (5.8)	23 (4.1)	573 (14.1)	9.9 (0.17)
Jordan	14 (2.5)	419 (8.7)	41 (3.9)	412 (6.7)	45 (4.0)	396 (6.1)	9.4 (0.18)
Turkey	14 (2.8)	475 (15.9)	50 (3.5)	454 (5.2)	35 (3.1)	441 (7.1)	9.7 (0.14)
Tunisia	13 (2.7)	416 (6.3)	49 (4.1)	425 (4.6)	38 (4.0)	427 (5.2)	9.6 (0.12)
Saudi Arabia	13 (2.6)	430 (11.7)	51 (4.7)	391 (5.9)	36 (4.4)	388 (7.3)	9.8 (0.17)
Syrian Arab Republic	13 (3.2)	366 (15.8)	41 (4.1)	389 (7.9)	47 (4.6)	374 (6.9)	9.4 (0.18)
Malaysia	12 (2.8)	471 (16.8)	59 (3.9)	427 (6.9)	29 (3.6)	455 (9.7)	10.0 (0.12)
Norway	11 (2.4)	475 (5.5)	65 (4.1)	474 (2.9)	24 (3.4)	478 (4.0)	9.8 (0.12)
Armenia	10 (1.9)	514 (8.7)	49 (3.7)	465 (4.4)	42 (3.6)	457 (4.8)	9.5 (0.11)
Palestinian Nat'l Auth.	10 (2.1)	399 (8.4)	51 (4.0)	413 (6.0)	39 (3.6)	394 (5.7)	9.4 (0.11)
Oman	9 (1.2)	396 (11.0)	38 (3.4)	372 (4.9)	53 (3.5)	356 (3.9)	8.9 (0.11)
Indonesia	9 (2.4)	425 (15.8)	32 (3.8)	397 (6.7)	60 (3.9)	374 (6.2)	8.9 (0.18)
Sweden r	8 (2.0)	501 (8.8)	51 (3.4)	488 (3.0)	41 (3.4)	480 (3.2)	9.4 (0.14)
Korea, Rep. of	8 (1.7)	610 (10.0)	36 (2.9)	600 (4.7)	56 (2.9)	621 (4.1)	9.0 (0.11)
Ghana	7 (2.0)	356 (16.7)	32 (4.1)	340 (7.1)	61 (3.9)	323 (5.9)	8.7 (0.13)
Morocco	4 (0.7)	490 (13.7)	34 (3.3)	372 (3.9)	62 (3.3)	362 (2.9)	8.8 (0.10)
International Avg.	21 (0.5)	479 (1.6)	49 (0.6)	467 (0.9)	31 (0.5)	464 (1.2)	

Centerpoint of scale set at 10.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 5.11: Teacher Working Conditions (Continued)

Country	Hardly Any Problems		Minor Problems		Moderate Problems		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Ninth Grade Participants							
Honduras	11 (3.1)	387 (18.3)	43 (4.6)	332 (7.0)	46 (4.3)	330 (4.8)	9.5 (0.17)
South Africa	9 (1.7)	468 (19.5)	26 (2.9)	365 (7.0)	64 (3.3)	331 (3.1)	8.6 (0.13)
Botswana	3 (1.4)	440 (31.1)	18 (3.1)	387 (6.6)	80 (3.4)	398 (2.8)	7.7 (0.19)
Benchmarking Participants							
Indiana, US r	65 (6.9)	523 (7.7)	29 (6.8)	513 (10.2)	5 (2.9)	491 (3.7)	12.1 (0.22)
Florida, US r	61 (5.9)	539 (8.9)	37 (6.1)	488 (8.0)	2 (1.6)	~ ~	12.5 (0.25)
Colorado, US r	53 (5.8)	515 (7.8)	44 (5.8)	520 (11.5)	4 (2.0)	550 (24.6)	11.6 (0.19)
Massachusetts, US	53 (6.8)	563 (7.5)	44 (6.5)	563 (8.9)	4 (2.6)	476 (13.1)	11.8 (0.23)
California, US r	48 (7.0)	500 (7.7)	42 (6.8)	487 (10.7)	11 (4.1)	480 (23.9)	11.6 (0.30)
Dubai, UAE	46 (3.7)	495 (5.0)	43 (3.7)	466 (5.7)	11 (2.0)	438 (9.8)	11.4 (0.12)
Minnesota, US	44 (5.8)	553 (7.2)	47 (6.4)	533 (9.4)	9 (4.4)	569 (19.7)	11.4 (0.23)
North Carolina, US r	43 (6.8)	536 (11.7)	45 (6.9)	541 (10.7)	12 (4.5)	561 (16.5)	11.4 (0.32)
Ontario, Canada	43 (4.2)	512 (3.9)	43 (4.2)	512 (4.1)	14 (3.1)	516 (8.8)	11.2 (0.18)
Connecticut, US	40 (6.8)	533 (9.6)	44 (6.6)	515 (13.5)	15 (4.6)	504 (16.3)	11.3 (0.29)
Alberta, Canada	37 (3.7)	506 (4.8)	49 (3.7)	506 (3.6)	14 (2.9)	497 (3.5)	11.0 (0.16)
Abu Dhabi, UAE	36 (3.9)	459 (9.1)	43 (4.0)	441 (5.8)	21 (3.3)	452 (7.9)	10.8 (0.19)
Quebec, Canada	34 (4.0)	545 (5.3)	52 (4.0)	525 (3.4)	14 (3.1)	529 (6.4)	11.0 (0.17)
Alabama, US r	34 (5.9)	466 (16.3)	46 (6.9)	474 (8.3)	21 (6.2)	455 (12.0)	10.9 (0.26)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

In your current school, how severe is each problem?

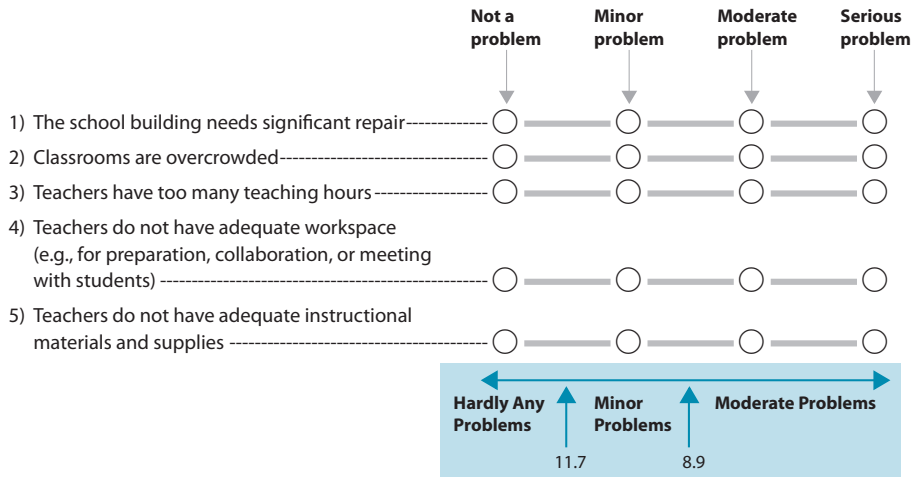


Exhibit 5.12: Schools with Difficulties Filling Vacancies for Mathematics Teachers

TIMSS 2011 Mathematics 8th Grade

Reported by Principals

Country	No Vacancies		Vacancies Are Easy to Fill		Vacancies Are Somewhat Difficult to Fill		Vacancies Are Very Difficult to Fill	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Armenia	97 (1.3)	467 (2.9)	1 (0.9)	~ ~	1 (0.9)	~ ~	0 (0.0)	~ ~
Australia	25 (2.7)	509 (10.2)	34 (4.0)	517 (10.1)	31 (3.5)	500 (9.1)	10 (2.5)	498 (16.8)
Bahrain	43 (0.3)	408 (3.3)	24 (0.2)	436 (2.7)	30 (0.3)	387 (3.5)	3 (0.1)	427 (8.8)
Chile	65 (4.0)	425 (4.3)	15 (3.5)	393 (10.1)	14 (3.1)	412 (12.7)	6 (2.1)	410 (9.5)
Chinese Taipei	46 (3.9)	607 (5.1)	44 (4.1)	615 (6.0)	10 (2.4)	600 (14.2)	1 (0.8)	~ ~
England	28 (4.3)	504 (11.7)	35 (4.8)	515 (10.6)	27 (4.2)	495 (13.1)	10 (2.9)	524 (19.2)
Finland	42 (3.6)	516 (3.2)	46 (3.8)	512 (3.8)	10 (2.4)	513 (6.5)	1 (0.8)	~ ~
Georgia	91 (1.9)	431 (4.0)	3 (1.2)	427 (25.1)	5 (1.4)	464 (14.0)	1 (1.0)	~ ~
Ghana	45 (3.6)	334 (6.2)	25 (3.6)	344 (10.9)	26 (3.9)	306 (7.0)	4 (1.5)	326 (16.5)
Hong Kong SAR	48 (5.3)	587 (7.6)	44 (5.3)	583 (8.9)	8 (2.7)	600 (26.3)	0 (0.0)	~ ~
Hungary	86 (3.2)	507 (3.5)	6 (2.1)	492 (11.8)	4 (1.7)	531 (21.6)	4 (1.7)	455 (41.3)
Indonesia	52 (4.1)	401 (5.5)	22 (3.8)	381 (7.8)	23 (3.6)	356 (11.5)	3 (1.2)	386 (29.9)
Iran, Islamic Rep. of	35 (3.2)	431 (8.0)	40 (2.7)	404 (5.5)	21 (2.8)	409 (11.1)	3 (1.3)	432 (25.0)
Israel	55 (4.3)	512 (7.1)	17 (3.3)	523 (12.4)	20 (3.6)	517 (10.9)	9 (2.4)	529 (19.7)
Italy	70 (3.5)	500 (3.4)	22 (3.2)	496 (5.9)	8 (1.4)	498 (7.1)	0 (0.4)	~ ~
Japan	82 (3.1)	572 (3.0)	6 (1.9)	553 (10.9)	8 (2.5)	567 (4.2)	3 (1.3)	560 (22.6)
Jordan	44 (3.7)	408 (6.5)	27 (3.2)	414 (6.5)	24 (3.3)	403 (6.9)	6 (1.9)	361 (22.0)
Kazakhstan	71 (3.6)	487 (4.5)	12 (2.7)	502 (13.5)	15 (3.1)	475 (11.1)	1 (1.1)	~ ~
Korea, Rep. of	67 (4.0)	611 (3.1)	16 (2.9)	625 (7.9)	15 (3.4)	603 (7.7)	2 (1.1)	~ ~
Lebanon	42 (4.6)	453 (6.3)	39 (4.6)	454 (6.3)	17 (3.5)	427 (9.7)	2 (1.1)	~ ~
Lithuania	93 (1.9)	503 (2.8)	6 (1.8)	506 (11.4)	0 (0.0)	~ ~	1 (0.7)	~ ~
Macedonia, Rep. of	64 (3.6)	425 (6.9)	28 (3.4)	444 (8.5)	7 (2.2)	407 (22.6)	1 (0.9)	~ ~
Malaysia	39 (3.2)	439 (7.4)	51 (3.2)	446 (8.0)	8 (1.6)	417 (27.9)	2 (1.1)	~ ~
Morocco	65 (3.4)	372 (2.8)	13 (2.2)	370 (8.2)	16 (2.4)	370 (5.3)	7 (1.8)	362 (12.0)
New Zealand	30 (4.1)	483 (8.8)	27 (4.2)	504 (7.5)	38 (4.5)	484 (9.9)	6 (2.0)	461 (13.7)
Norway	38 (4.6)	475 (4.8)	40 (4.8)	476 (3.3)	20 (3.4)	472 (4.8)	2 (1.2)	~ ~
Oman	55 (3.2)	357 (4.5)	19 (2.4)	379 (6.2)	19 (2.5)	376 (8.6)	7 (1.5)	364 (11.1)
Palestinian Nat'l Auth.	66 (3.7)	406 (4.8)	25 (3.2)	407 (8.6)	6 (2.0)	394 (12.3)	2 (1.2)	~ ~
Qatar	47 (0.8)	409 (5.8)	25 (0.2)	421 (4.0)	25 (0.7)	392 (5.2)	3 (0.0)	411 (10.6)
Romania	78 (3.6)	463 (4.8)	19 (3.2)	445 (10.6)	2 (0.9)	~ ~	2 (1.4)	~ ~
Russian Federation	81 (2.8)	542 (3.8)	11 (1.8)	525 (9.9)	6 (1.9)	543 (10.6)	2 (1.1)	~ ~
Saudi Arabia	52 (4.3)	393 (5.6)	29 (3.7)	397 (9.5)	16 (2.8)	394 (12.3)	4 (1.8)	378 (22.5)
Singapore	59 (0.0)	609 (4.8)	38 (0.0)	613 (5.8)	2 (0.0)	~ ~	0 (0.0)	~ ~
Slovenia	72 (3.6)	505 (2.6)	22 (3.2)	505 (4.3)	5 (1.9)	499 (11.6)	1 (0.0)	~ ~
Sweden r	51 (4.4)	484 (3.1)	26 (3.4)	481 (4.2)	14 (3.0)	491 (7.3)	9 (3.2)	487 (4.7)
Syrian Arab Republic	46 (4.5)	387 (6.9)	25 (3.5)	378 (8.4)	21 (3.9)	368 (11.2)	8 (2.8)	380 (17.6)
Thailand	32 (4.2)	421 (6.8)	10 (2.7)	425 (21.4)	36 (3.6)	440 (8.7)	22 (3.7)	417 (10.0)
Tunisia	63 (3.6)	426 (4.1)	27 (3.2)	421 (4.5)	8 (2.3)	416 (10.5)	1 (0.0)	~ ~
Turkey	66 (2.6)	465 (5.3)	12 (2.0)	430 (10.4)	13 (2.1)	444 (11.2)	9 (1.6)	408 (6.4)
Ukraine	96 (1.7)	479 (3.9)	1 (0.6)	~ ~	2 (1.2)	~ ~	1 (1.0)	~ ~
United Arab Emirates	48 (2.3)	442 (3.3)	26 (2.2)	466 (5.3)	23 (1.7)	468 (4.9)	3 (0.6)	459 (11.6)
United States	63 (2.5)	512 (3.6)	25 (2.0)	512 (4.8)	9 (1.5)	498 (10.3)	3 (0.8)	501 (19.6)
International Avg.	58 (0.5)	468 (0.9)	23 (0.5)	468 (1.5)	15 (0.4)	458 (2.0)	4 (0.2)	433 (4.0)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students.

Exhibit 5.12: Schools with Difficulties Filling Vacancies for Mathematics Teachers (Continued)

Country	No Vacancies		Vacancies Are Easy to Fill		Vacancies Are Somewhat Difficult to Fill		Vacancies Are Very Difficult to Fill	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Ninth Grade Participants								
Botswana	46 (4.1)	393 (4.1)	21 (3.6)	402 (6.1)	24 (3.5)	399 (6.9)	9 (2.1)	388 (5.5)
Honduras	61 (4.7)	335 (4.4)	14 (3.1)	344 (8.5)	17 (3.7)	349 (16.8)	8 (2.9)	318 (11.9)
South Africa	44 (3.9)	355 (5.2)	9 (2.0)	373 (12.1)	31 (3.7)	356 (7.0)	16 (3.0)	327 (6.4)
Benchmarking Participants								
Alberta, Canada	59 (4.1)	505 (3.3)	31 (4.0)	508 (5.0)	8 (2.3)	500 (7.6)	1 (1.0)	~ ~
Ontario, Canada	74 (4.0)	511 (3.3)	18 (3.4)	513 (7.2)	8 (2.7)	518 (8.8)	0 (0.0)	~ ~
Quebec, Canada	34 (3.7)	543 (4.7)	41 (4.0)	528 (4.3)	19 (3.8)	518 (5.5)	5 (2.0)	539 (9.2)
Abu Dhabi, UAE	52 (4.3)	436 (5.7)	30 (4.3)	458 (11.6)	15 (2.9)	472 (11.1)	3 (1.4)	469 (24.4)
Dubai, UAE	30 (0.3)	465 (3.4)	27 (0.4)	496 (5.5)	40 (0.5)	474 (3.7)	3 (0.0)	471 (8.9)
Alabama, US r	67 (6.8)	462 (7.4)	25 (6.2)	494 (11.7)	7 (3.5)	421 (13.4)	0 (0.0)	~ ~
California, US r	60 (6.4)	498 (6.7)	20 (5.8)	487 (16.0)	13 (3.4)	490 (17.6)	6 (3.0)	471 (25.4)
Colorado, US	47 (7.1)	529 (8.7)	32 (7.0)	520 (12.7)	7 (3.6)	498 (13.4)	13 (4.3)	477 (17.6)
Connecticut, US	78 (5.6)	526 (8.4)	20 (5.2)	499 (15.1)	2 (0.1)	~ ~	0 (0.0)	~ ~
Florida, US	46 (7.8)	527 (10.3)	40 (7.2)	506 (9.2)	3 (3.1)	432 (12.0)	10 (4.4)	500 (30.3)
Indiana, US r	56 (7.0)	525 (5.7)	38 (6.8)	529 (9.8)	6 (3.5)	491 (32.1)	0 (0.0)	~ ~
Massachusetts, US	53 (7.1)	551 (7.8)	25 (5.8)	566 (15.3)	18 (6.0)	583 (16.4)	4 (2.8)	516 (1.9)
Minnesota, US	66 (7.0)	539 (6.3)	24 (6.0)	564 (13.2)	7 (4.4)	552 (9.1)	3 (2.7)	546 (4.9)
North Carolina, US	60 (7.0)	526 (10.6)	27 (5.8)	542 (9.3)	13 (4.8)	568 (29.1)	0 (0.0)	~ ~

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Size of School Library

Libraries, both within the school and in the local community, provide a range of reading materials and other resources from which teachers can draw to expand their instructional approaches, and from which students can choose books for their own learning and enjoyment. Also, with the growing use of technology, libraries increasingly are becoming media centers offering Internet access to a wide range of materials, with the potential to improve achievement in all areas, including mathematics.

Exhibit 5.13 presents principals' reports about the existence and size of school libraries for participants in the TIMSS 2011 fourth grade assessment. In considering the results in this exhibit, it is important to realize that, because of variation in policies across countries regarding school libraries and classroom libraries, some countries have well-resourced classroom libraries rather than a larger central library, so the lack of a school library does not necessarily mean that children do not have access to a variety of books. Also, primary schools tend to be smaller than middle and secondary schools, and may have small libraries as a result of their small enrollments.

On average, across the fourth grade countries, 32 percent of the students attended schools (for the most part primary schools) having well-resourced school libraries with more than 5,000 book titles. Another 38 percent of the students attended schools having libraries with between 501 and 5,000 book titles, and 17 percent attended schools having smaller library collections of 500 book titles or fewer. On average internationally, 13 percent of fourth grade students attended schools with no school library.

Average mathematics achievement was positively related to school library size, with the fourth grade students attending schools with well-resourced school libraries having the highest achievement and students with no school library the lowest achievement (506 vs. 474). For countries at the sixth grade, there were few students in schools with libraries having more than 5,000 book titles, and high percentages of students with no school library.

Schools with Computers Available for Instruction

Recent research reviews suggest that computer use continues to grow in mathematics and science instruction. For example, a meta-analysis of the impact of computer technology on mathematics education in US classrooms found significant positive effects, and in particular that computer technology had a stronger effect in promoting mathematics achievement among elementary compared to secondary school students (Li & Ma, 2010).

Exhibit 5.14 shows principals' reports about the availability of computers for instruction for participants in the TIMSS fourth grade assessment. Internationally, 38 percent of the fourth grade students, on average, were in schools that had 1 computer for every 1–2 fourth grade students, 30 percent were in schools with 1 computer for every 3–5 fourth grade students, and 24 percent were in schools with 1 computer for 6 or more students. There was considerable variation from country to country, with the highest computer-to-student ratio in England (90% of students in schools with 1 computer for every 1–2 fourth grade students) and the lowest in Iran, Tunisia, and Yemen (7% or fewer students in such schools). On average, however, only 8 percent of the fourth grade students were in schools that did not have any computers available for instruction. The percentages of students in schools with no computers for instruction were higher for the sixth grade participants.

The relationship between computer availability and average mathematics achievement is difficult to interpret because it is highly interrelated with socio-economic levels and instructional practices. In the primary grades, computer instruction can be used for remedial purposes as frequently (if not more frequently) because it can provide an increased variety of stimulating and challenging activities. However, the fourth grade students with access to computers for instruction had higher average mathematics achievement than those students with no access to computers for instruction.

Exhibit 5.15 provides principals' reports about the availability of computers for instruction for participants in the TIMSS eighth grade assessment. Levels of computer availability are similar to the fourth grade (although a little more favorable), with 40 percent of the eighth grade students, on average, in schools having 1 computer for every 1–2 eighth grade students, 28 percent in schools with 1 computer for every 3–5 eighth grade students, and 28 percent in schools with 1 computer for 6 or more students. Only 4 percent of the eighth grade students were in schools with no provision for computers for instruction. Eighth grade participants with 70 percent or more of students in schools with the highest computer-to-student ratio (1 computer for every 1–2 eighth grade students) included Australia, England, Georgia, Hungary, Macedonia, New Zealand, Norway, Slovenia, and, among benchmarking participants, Alberta, Colorado, and Indiana. Similar to the fourth grade, there was no relationship between computer-to-student ratio and mathematic achievement, but the 4 percent of students in schools with no computers available for instruction had lower average mathematics achievement than students in schools with some access to computers.

Exhibit 5.13: Size of School Library

TIMSS 2011 Mathematics 4th Grade

Reported by Principals (Does not include classroom libraries)

Country	More than 5,000 Book Titles		501–5,000 Book Titles		500 Book Titles or Fewer		No School Library	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Armenia	42 (4.0)	448 (5.7)	50 (3.9)	454 (4.7)	8 (2.3)	459 (12.7)	0 (0.5)	~ ~
Australia	56 (3.6)	519 (4.0)	42 (3.7)	513 (5.4)	1 (0.5)	~ ~	1 (0.0)	~ ~
Austria	1 (0.1)	~ ~	45 (4.5)	509 (2.8)	27 (4.2)	498 (6.1)	27 (3.6)	516 (4.0)
Azerbaijan	29 (3.6)	472 (11.0)	44 (4.1)	469 (10.0)	28 (3.7)	445 (10.5)	0 (0.0)	~ ~
Bahrain	27 (4.8)	464 (8.2)	48 (5.5)	431 (5.7)	25 (4.1)	420 (8.8)	0 (0.0)	~ ~
Belgium (Flemish)	1 (0.0)	~ ~	13 (3.3)	547 (4.8)	26 (3.8)	553 (4.2)	60 (4.6)	548 (2.4)
Chile	16 (2.8)	504 (7.2)	58 (4.2)	459 (4.5)	22 (3.1)	452 (7.5)	4 (1.3)	444 (9.6)
Chinese Taipei	90 (2.8)	593 (2.2)	9 (2.7)	580 (5.4)	0 (0.0)	~ ~	1 (0.8)	~ ~
Croatia	39 (4.2)	493 (3.3)	53 (4.3)	489 (2.8)	8 (1.8)	474 (12.2)	0 (0.0)	~ ~
Czech Republic	6 (1.6)	510 (6.1)	55 (4.1)	511 (3.7)	23 (3.6)	512 (4.5)	17 (3.5)	508 (5.8)
Denmark r	68 (3.6)	542 (3.1)	26 (3.7)	536 (5.9)	2 (1.5)	~ ~	4 (1.3)	541 (12.2)
England	13 (2.9)	536 (10.6)	63 (4.6)	550 (5.0)	15 (3.6)	525 (10.4)	8 (2.3)	520 (20.0)
Finland	4 (1.7)	557 (10.0)	47 (4.3)	545 (2.7)	27 (3.8)	546 (6.6)	21 (3.4)	540 (6.5)
Georgia	35 (3.2)	452 (5.4)	49 (3.6)	449 (7.4)	13 (2.4)	446 (9.8)	2 (1.3)	~ ~
Germany	2 (1.0)	~ ~	39 (3.4)	531 (3.8)	33 (3.6)	523 (4.5)	26 (3.3)	533 (3.7)
Hong Kong SAR	82 (3.2)	608 (4.1)	18 (3.2)	594 (6.0)	0 (0.0)	~ ~	0 (0.0)	~ ~
Hungary	52 (4.0)	525 (4.8)	41 (4.3)	508 (6.7)	3 (1.3)	497 (20.4)	4 (1.6)	506 (32.1)
Iran, Islamic Rep. of	3 (1.2)	484 (24.8)	40 (4.0)	452 (6.4)	37 (3.6)	426 (5.3)	20 (3.1)	397 (9.1)
Ireland	7 (2.1)	513 (7.1)	30 (4.0)	526 (6.5)	14 (2.8)	535 (8.3)	49 (4.2)	530 (3.7)
Italy	5 (1.4)	499 (13.4)	41 (3.9)	512 (4.4)	42 (3.8)	503 (4.4)	12 (2.6)	505 (7.6)
Japan	81 (3.1)	586 (1.9)	18 (3.2)	579 (5.1)	0 (0.0)	~ ~	1 (0.7)	~ ~
Kazakhstan	65 (3.9)	501 (5.7)	30 (3.9)	499 (8.7)	5 (1.9)	462 (24.5)	0 (0.0)	~ ~
Korea, Rep. of	92 (2.5)	605 (2.1)	8 (2.4)	599 (3.5)	0 (0.0)	~ ~	1 (0.0)	~ ~
Kuwait	3 (1.5)	335 (11.8)	37 (4.4)	348 (6.0)	59 (4.1)	342 (4.9)	1 (0.7)	~ ~
Lithuania	46 (3.9)	533 (3.7)	45 (4.0)	533 (4.4)	6 (1.7)	562 (11.0)	3 (0.8)	522 (13.4)
Malta	11 (0.1)	515 (3.6)	58 (0.1)	500 (1.7)	17 (0.1)	483 (3.4)	14 (0.1)	479 (3.4)
Morocco	0 (0.3)	~ ~	6 (2.2)	370 (11.5)	24 (3.0)	365 (10.2)	70 (3.3)	321 (5.2)
Netherlands	– –	– –	– –	– –	– –	– –	– –	– –
New Zealand	46 (3.8)	490 (4.9)	53 (3.7)	484 (4.3)	0 (0.0)	~ ~	1 (1.0)	~ ~
Northern Ireland r	3 (1.5)	540 (11.9)	51 (4.6)	561 (5.4)	15 (3.9)	540 (14.1)	31 (4.0)	578 (6.5)
Norway	18 (4.0)	498 (5.8)	73 (4.8)	494 (3.7)	4 (2.3)	500 (9.4)	4 (2.0)	481 (18.0)
Oman r	11 (2.2)	374 (7.8)	58 (3.7)	380 (3.8)	10 (2.1)	401 (10.8)	21 (2.6)	369 (6.7)
Poland	65 (3.6)	484 (2.8)	32 (3.6)	475 (4.9)	2 (1.0)	~ ~	1 (0.9)	~ ~
Portugal	5 (2.0)	524 (11.0)	47 (5.4)	527 (5.4)	24 (4.0)	543 (8.5)	25 (4.1)	532 (5.4)
Qatar	52 (3.4)	429 (6.5)	34 (3.3)	391 (6.0)	13 (2.2)	390 (7.2)	1 (1.0)	~ ~
Romania	45 (3.9)	494 (7.4)	45 (4.2)	468 (10.0)	6 (1.7)	493 (16.8)	4 (1.7)	474 (24.6)
Russian Federation	65 (3.4)	544 (4.4)	31 (3.4)	541 (6.2)	3 (1.8)	533 (24.9)	1 (0.0)	~ ~
Saudi Arabia	3 (1.5)	435 (18.2)	17 (3.0)	418 (14.1)	55 (4.2)	414 (8.1)	25 (3.6)	399 (8.8)
Serbia	66 (4.0)	524 (4.0)	22 (3.5)	505 (6.8)	8 (2.5)	478 (15.4)	4 (1.6)	498 (9.0)
Singapore	77 (0.0)	606 (3.6)	22 (0.0)	606 (7.2)	1 (0.0)	~ ~	0 (0.0)	~ ~
Slovak Republic	11 (2.0)	504 (9.9)	58 (3.9)	508 (5.0)	20 (3.2)	494 (7.7)	12 (2.6)	514 (6.4)
Slovenia	66 (2.9)	511 (2.1)	27 (3.6)	513 (3.7)	6 (2.7)	533 (14.2)	1 (0.6)	~ ~
Spain	19 (3.2)	495 (6.1)	69 (4.0)	481 (3.6)	8 (1.8)	478 (12.8)	3 (1.6)	486 (18.5)
Sweden r	18 (3.7)	507 (4.7)	52 (5.0)	503 (4.0)	12 (3.4)	508 (6.1)	18 (3.8)	502 (6.6)
Thailand	18 (3.1)	494 (7.0)	37 (4.6)	456 (7.1)	42 (3.7)	438 (7.3)	3 (1.6)	514 (26.8)
Tunisia	0 (0.1)	~ ~	5 (2.2)	363 (10.1)	61 (3.8)	364 (5.4)	34 (3.3)	349 (7.7)
Turkey	1 (0.7)	~ ~	38 (3.2)	487 (5.4)	36 (3.3)	478 (5.3)	24 (2.7)	420 (13.1)
United Arab Emirates r	27 (1.4)	473 (5.3)	47 (2.3)	424 (3.6)	23 (2.1)	409 (6.1)	3 (0.8)	443 (20.0)
United States	62 (3.1)	546 (2.3)	34 (2.9)	536 (3.8)	3 (1.2)	534 (13.5)	1 (0.8)	~ ~
Yemen r	1 (0.7)	~ ~	3 (1.0)	306 (5.5)	19 (3.3)	264 (15.5)	77 (3.4)	247 (7.0)
International Avg.	32 (0.4)	506 (1.3)	38 (0.5)	490 (0.9)	17 (0.4)	471 (1.8)	13 (0.3)	474 (2.4)

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A tilde (~) indicates insufficient data to report achievement.
An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 5.13: Size of School Library (Continued)

Country	More than 5,000 Book Titles		501–5,000 Book Titles		500 Book Titles or Fewer		No School Library	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Sixth Grade Participants								
Botswana	3 (1.2)	458 (35.2)	12 (2.7)	454 (21.5)	33 (4.1)	420 (6.3)	52 (4.5)	409 (4.5)
Honduras	0 (0.0)	~ ~	15 (3.5)	449 (17.2)	30 (4.2)	395 (10.8)	55 (4.2)	384 (6.3)
Yemen	1 (0.0)	~ ~	4 (1.4)	394 (8.7)	21 (3.3)	354 (9.4)	73 (3.5)	344 (7.4)
Benchmarking Participants								
Alberta, Canada	70 (4.0)	510 (2.7)	30 (4.0)	502 (6.1)	0 (0.0)	~ ~	0 (0.0)	~ ~
Ontario, Canada	51 (4.3)	520 (4.4)	45 (4.3)	515 (4.4)	2 (1.5)	~ ~	1 (1.0)	~ ~
Quebec, Canada	42 (4.2)	534 (4.2)	52 (4.0)	533 (3.0)	5 (1.9)	538 (6.2)	2 (1.1)	~ ~
Abu Dhabi, UAE r	22 (3.6)	443 (13.6)	46 (4.8)	412 (7.5)	27 (3.8)	403 (8.9)	5 (1.7)	448 (21.3)
Dubai, UAE r	51 (0.2)	501 (2.7)	39 (0.2)	448 (2.5)	10 (0.2)	409 (4.1)	0 (0.0)	~ ~
Florida, US r	65 (6.9)	545 (4.8)	30 (6.1)	547 (9.0)	3 (2.3)	510 (7.5)	2 (0.1)	~ ~
North Carolina, US	76 (6.2)	555 (5.7)	24 (6.2)	559 (9.4)	0 (0.0)	~ ~	0 (0.0)	~ ~

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Does your school have a school library?

1) Yes
2) No

If Yes,

A. Approximately how many books with different titles does your school library have (exclude magazines and periodicals)?

1) 250 or fewer
2) 251–500
3) 501–2,000
4) 2,001–5,000
5) 5,001–10,000
6) More than 10,000

Exhibit 5.14: Schools with Computers Available for Instruction

TIMSS 2011 4th Grade Mathematics

Reported by Principals

Country	1 Computer for 1–2 Students		1 Computer for 3–5 Students		1 Computer for 6 or More Students		No Computers Available	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Armenia	26 (3.7)	455 (9.3)	46 (4.3)	451 (5.5)	24 (3.7)	445 (6.2)	4 (1.8)	474 (13.1)
Australia	65 (3.7)	520 (3.8)	26 (3.2)	512 (6.3)	9 (2.4)	518 (6.6)	0 (0.1)	~ ~
Austria	11 (2.4)	525 (7.0)	19 (2.7)	511 (4.3)	66 (3.7)	507 (2.8)	4 (3.0)	472 (27.8)
Azerbaijan	19 (3.2)	466 (18.9)	37 (4.1)	451 (8.1)	29 (3.7)	483 (9.6)	15 (3.2)	447 (16.5)
Bahrain r	42 (3.9)	444 (5.4)	43 (4.4)	432 (6.4)	15 (2.8)	427 (14.2)	0 (0.0)	~ ~
Belgium (Flemish)	41 (4.3)	552 (3.2)	34 (3.7)	552 (2.9)	25 (4.0)	545 (3.1)	0 (0.0)	~ ~
Chile r	58 (3.7)	458 (4.2)	32 (3.6)	469 (6.2)	7 (2.2)	481 (12.2)	2 (1.1)	~ ~
Chinese Taipei	23 (2.7)	575 (4.6)	41 (3.7)	594 (3.5)	36 (3.6)	601 (2.8)	0 (0.0)	~ ~
Croatia	12 (2.4)	486 (5.5)	21 (3.3)	496 (4.1)	50 (4.3)	490 (3.1)	17 (3.1)	488 (4.8)
Czech Republic	66 (3.5)	507 (3.3)	26 (3.1)	516 (3.4)	5 (1.9)	523 (5.6)	3 (1.5)	526 (10.8)
Denmark s	44 (4.7)	539 (3.7)	42 (4.4)	543 (4.1)	14 (3.3)	552 (7.9)	0 (0.0)	~ ~
England r	90 (2.8)	543 (4.2)	10 (2.8)	549 (16.6)	0 (0.0)	~ ~	0 (0.0)	~ ~
Finland	55 (4.3)	546 (3.5)	28 (4.1)	541 (4.6)	15 (3.2)	550 (4.4)	2 (1.2)	~ ~
Georgia	64 (3.7)	441 (5.1)	25 (3.6)	460 (10.2)	9 (2.7)	486 (11.0)	2 (1.1)	~ ~
Germany	21 (2.5)	523 (6.6)	49 (3.6)	533 (3.3)	28 (3.4)	530 (3.4)	1 (0.9)	~ ~
Hong Kong SAR	56 (4.3)	593 (6.7)	43 (4.2)	614 (4.4)	1 (0.7)	~ ~	0 (0.0)	~ ~
Hungary	53 (3.9)	509 (5.2)	26 (3.4)	523 (8.1)	11 (2.8)	548 (7.5)	10 (2.7)	504 (15.3)
Iran, Islamic Rep. of	1 (0.5)	~ ~	2 (0.8)	~ ~	23 (3.3)	446 (7.4)	74 (3.4)	422 (4.5)
Ireland	35 (4.0)	526 (6.6)	27 (3.2)	532 (5.9)	38 (4.2)	527 (4.4)	0 (0.0)	~ ~
Italy	20 (3.0)	509 (6.4)	34 (3.4)	505 (5.1)	45 (3.6)	509 (4.5)	1 (0.0)	~ ~
Japan	48 (3.3)	579 (3.0)	44 (4.0)	590 (2.6)	8 (2.1)	596 (5.8)	0 (0.0)	~ ~
Kazakhstan	35 (3.9)	502 (8.2)	24 (3.6)	507 (10.2)	27 (4.0)	488 (8.4)	14 (2.7)	514 (13.8)
Korea, Rep. of	22 (3.5)	595 (3.9)	46 (4.0)	604 (2.5)	30 (3.7)	611 (3.6)	2 (1.1)	~ ~
Kuwait	40 (4.3)	349 (6.3)	50 (4.5)	338 (5.3)	9 (2.6)	337 (11.6)	1 (0.9)	~ ~
Lithuania	29 (3.2)	521 (5.7)	24 (3.9)	533 (5.8)	42 (3.9)	544 (4.7)	5 (1.8)	530 (5.9)
Malta	15 (0.1)	506 (3.4)	67 (0.1)	493 (1.7)	18 (0.1)	495 (3.1)	0 (0.0)	~ ~
Morocco	11 (2.3)	361 (21.0)	9 (2.2)	345 (10.1)	49 (4.0)	333 (5.1)	31 (3.4)	323 (9.3)
Netherlands r	34 (4.4)	538 (3.6)	38 (5.4)	545 (3.6)	28 (4.9)	541 (5.0)	0 (0.0)	~ ~
New Zealand	70 (3.3)	483 (4.1)	22 (3.1)	501 (8.1)	7 (2.0)	485 (14.8)	1 (0.7)	~ ~
Northern Ireland r	77 (4.3)	558 (4.4)	17 (3.8)	574 (6.6)	5 (2.3)	569 (11.1)	0 (0.0)	~ ~
Norway	58 (5.1)	493 (4.1)	26 (4.2)	494 (5.8)	16 (3.6)	502 (4.8)	1 (0.0)	~ ~
Oman r	22 (2.3)	372 (5.4)	13 (1.9)	377 (10.3)	61 (2.8)	384 (3.8)	3 (0.8)	310 (14.9)
Poland	31 (3.0)	470 (4.5)	29 (3.7)	486 (3.8)	25 (3.4)	490 (4.5)	15 (2.6)	479 (6.9)
Portugal	14 (3.2)	553 (8.2)	21 (5.2)	523 (10.8)	58 (5.3)	534 (4.3)	7 (2.4)	517 (14.0)
Qatar	42 (3.5)	413 (6.7)	32 (3.7)	398 (9.4)	26 (1.3)	442 (6.9)	1 (0.6)	~ ~
Romania	42 (3.7)	471 (9.5)	34 (3.9)	483 (10.2)	19 (3.4)	495 (14.8)	5 (1.7)	501 (17.5)
Russian Federation	28 (3.0)	538 (7.1)	33 (4.0)	538 (5.1)	34 (3.4)	543 (5.8)	6 (2.1)	575 (13.5)
Saudi Arabia	16 (2.9)	430 (18.3)	20 (4.1)	415 (12.2)	28 (3.7)	402 (7.4)	36 (4.0)	404 (7.4)
Serbia	16 (2.6)	511 (8.1)	36 (3.6)	517 (5.8)	35 (4.4)	516 (6.0)	12 (2.6)	516 (8.5)
Singapore	51 (0.0)	607 (4.4)	47 (0.0)	605 (5.4)	3 (0.0)	612 (29.8)	0 (0.0)	~ ~
Slovak Republic	81 (2.5)	504 (4.5)	14 (2.1)	512 (9.2)	4 (1.4)	516 (11.8)	0 (0.0)	~ ~
Slovenia	65 (3.3)	513 (2.9)	30 (3.7)	514 (3.4)	5 (1.6)	506 (6.7)	0 (0.0)	~ ~
Spain	50 (3.9)	474 (4.7)	35 (4.1)	491 (4.5)	10 (2.5)	504 (8.3)	6 (2.0)	468 (9.5)
Sweden r	29 (3.6)	509 (5.4)	37 (4.6)	498 (3.9)	35 (4.4)	502 (4.0)	0 (0.0)	~ ~
Thailand	37 (3.8)	467 (6.4)	32 (4.2)	445 (8.5)	23 (3.6)	471 (11.7)	8 (2.6)	431 (15.2)
Tunisia	7 (1.7)	376 (8.4)	23 (2.9)	338 (8.9)	51 (3.9)	366 (5.8)	18 (3.2)	354 (9.0)
Turkey	18 (2.6)	467 (6.8)	27 (3.0)	470 (11.2)	43 (3.2)	476 (6.7)	11 (2.2)	438 (25.9)
United Arab Emirates r	32 (2.0)	422 (4.2)	40 (2.3)	417 (3.5)	27 (2.0)	457 (6.0)	1 (0.5)	~ ~
United States r	65 (2.8)	547 (2.7)	26 (2.4)	536 (3.9)	8 (1.5)	537 (7.8)	1 (0.0)	~ ~
Yemen r	6 (2.0)	225 (20.0)	7 (2.6)	271 (33.0)	15 (3.5)	264 (12.2)	72 (4.2)	252 (7.2)
International Avg.	38 (0.5)	491 (1.1)	30 (0.5)	493 (1.2)	24 (0.5)	493 (1.3)	8 (0.3)	452 (2.9)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

TIMSS & PIRLS International Study Center
Lynch School of Education, Boston College

Exhibit 5.14: Schools with Computers Available for Instruction (Continued)

Country	1 Computer for 1–2 Students		1 Computer for 3–5 Students		1 Computer for 6 or More Students		No Computers Available	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Sixth Grade Participants								
Botswana	13 (3.1)	428 (18.3)	15 (3.2)	460 (15.0)	41 (4.5)	410 (5.5)	31 (4.1)	412 (6.3)
Honduras	24 (3.9)	425 (13.4)	24 (4.0)	404 (6.9)	15 (2.7)	420 (7.0)	37 (4.0)	370 (10.5)
Yemen r	9 (2.7)	342 (11.0)	6 (2.5)	380 (15.8)	12 (3.5)	356 (18.3)	73 (4.6)	345 (8.0)
Benchmarking Participants								
Alberta, Canada	91 (3.3)	506 (2.6)	8 (3.2)	516 (4.0)	1 (0.0)	~ ~	0 (0.0)	~ ~
Ontario, Canada	74 (3.7)	514 (3.6)	19 (3.6)	530 (7.0)	7 (1.6)	526 (11.6)	0 (0.0)	~ ~
Quebec, Canada	64 (3.6)	536 (3.7)	29 (3.6)	531 (2.6)	7 (2.5)	533 (9.1)	0 (0.0)	~ ~
Abu Dhabi, UAE r	30 (3.7)	398 (9.2)	43 (3.9)	414 (7.0)	25 (3.9)	423 (12.4)	2 (1.2)	~ ~
Dubai, UAE r	35 (0.4)	475 (3.1)	35 (0.5)	435 (3.3)	29 (0.3)	477 (2.8)	0 (0.0)	~ ~
Florida, US r	55 (6.2)	548 (4.5)	36 (6.2)	546 (7.4)	8 (3.4)	513 (8.3)	0 (0.0)	~ ~
North Carolina, US	62 (7.1)	554 (5.7)	31 (7.0)	553 (7.3)	7 (4.1)	580 (19.2)	0 (0.0)	~ ~

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

The number of students per computer was calculated by dividing the number of students by the number of computers.

1) **What is the total enrollment of fourth grade students in your school as of the first day of the month TIMSS 2011 testing begins?**

2) **What is the total number of computers that can be used for instructional purposes by fourth grade students?**

Exhibit 5.15: Schools with Computers Available for Instruction

TIMSS 2011 8th Grade Mathematics

Reported by Principals

Country	1 Computer for 1–2 Students		1 Computer for 3–5 Students		1 Computer for 6 or More Students		No Computers Available	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Armenia	24 (3.4)	457 (6.7)	50 (4.2)	470 (4.9)	26 (3.2)	475 (5.7)	0 (0.0)	~ ~
Australia	89 (2.4)	508 (5.6)	9 (2.4)	509 (11.5)	2 (1.2)	~ ~	0 (0.0)	~ ~
Bahrain	32 (0.3)	414 (3.2)	35 (0.3)	414 (3.0)	26 (0.3)	397 (3.6)	7 (0.1)	368 (11.5)
Chile	49 (4.1)	420 (4.4)	38 (4.0)	414 (5.7)	11 (2.6)	422 (12.8)	2 (1.1)	~ ~
Chinese Taipei	6 (1.8)	619 (25.3)	18 (2.9)	591 (12.6)	76 (3.3)	614 (3.8)	1 (0.7)	~ ~
England	99 (0.9)	510 (5.8)	1 (0.9)	~ ~	0 (0.0)	~ ~	0 (0.0)	~ ~
Finland	47 (3.8)	518 (3.5)	44 (4.0)	510 (3.6)	7 (2.1)	506 (7.8)	2 (1.2)	~ ~
Georgia	70 (3.2)	421 (5.3)	25 (3.5)	455 (9.9)	4 (1.7)	445 (15.1)	1 (0.0)	~ ~
Ghana	42 (4.0)	326 (6.7)	13 (2.5)	359 (17.5)	31 (3.6)	342 (6.9)	15 (3.4)	302 (10.6)
Hong Kong SAR	54 (4.9)	576 (8.0)	37 (4.6)	595 (9.5)	9 (3.0)	584 (18.0)	0 (0.0)	~ ~
Hungary	71 (3.9)	499 (4.7)	25 (3.6)	531 (7.4)	2 (0.9)	~ ~	2 (1.3)	~ ~
Indonesia r	1 (0.5)	~ ~	11 (2.6)	403 (10.6)	87 (2.7)	391 (4.7)	2 (1.3)	~ ~
Iran, Islamic Rep. of	1 (0.9)	~ ~	5 (2.0)	488 (18.5)	44 (3.1)	425 (7.1)	49 (3.2)	393 (4.6)
Israel	19 (3.2)	526 (11.7)	35 (4.3)	522 (7.3)	41 (4.0)	508 (9.1)	4 (1.9)	531 (16.5)
Italy	16 (2.8)	500 (6.8)	43 (4.2)	495 (4.8)	41 (3.9)	504 (4.3)	0 (0.4)	~ ~
Japan	31 (2.4)	572 (6.4)	48 (3.2)	573 (3.6)	22 (2.7)	561 (5.3)	0 (0.0)	~ ~
Jordan	31 (3.1)	399 (6.9)	41 (4.0)	413 (6.8)	26 (2.9)	406 (5.8)	2 (1.2)	~ ~
Kazakhstan	57 (3.8)	491 (5.6)	26 (3.7)	478 (9.5)	17 (3.0)	491 (8.3)	0 (0.0)	~ ~
Korea, Rep. of	6 (2.3)	589 (9.3)	26 (3.6)	610 (4.9)	68 (4.0)	616 (3.2)	0 (0.0)	~ ~
Lebanon	38 (4.1)	461 (6.2)	40 (4.3)	451 (6.8)	16 (3.0)	449 (10.6)	5 (2.0)	395 (9.0)
Lithuania	62 (3.8)	494 (3.6)	30 (3.8)	511 (5.0)	8 (2.7)	528 (13.1)	0 (0.0)	~ ~
Macedonia, Rep. of r	72 (3.8)	431 (6.8)	16 (2.9)	425 (13.1)	9 (2.3)	423 (17.8)	3 (1.3)	369 (43.7)
Malaysia	2 (1.1)	~ ~	13 (2.7)	429 (16.3)	78 (3.1)	436 (5.4)	6 (1.9)	464 (12.5)
Morocco	6 (1.5)	405 (13.4)	10 (1.5)	394 (11.3)	70 (2.8)	368 (2.9)	13 (2.6)	364 (5.2)
New Zealand r	88 (4.2)	483 (5.2)	8 (3.4)	519 (15.4)	4 (2.7)	527 (32.0)	0 (0.0)	~ ~
Norway	73 (4.2)	479 (2.9)	23 (3.9)	462 (4.7)	4 (1.9)	479 (18.3)	0 (0.0)	~ ~
Oman	47 (3.1)	373 (3.9)	34 (3.2)	359 (5.5)	15 (2.5)	369 (10.5)	4 (1.6)	373 (14.0)
Palestinian Nat'l Auth.	25 (3.2)	433 (8.7)	21 (2.9)	416 (6.7)	49 (3.7)	390 (4.9)	5 (1.4)	362 (12.6)
Qatar r	44 (0.5)	422 (6.0)	48 (0.5)	406 (4.2)	7 (0.1)	407 (8.3)	1 (0.0)	~ ~
Romania	45 (3.8)	455 (8.0)	34 (4.0)	449 (7.7)	19 (3.4)	484 (10.2)	2 (1.2)	~ ~
Russian Federation	50 (3.3)	540 (5.3)	40 (3.6)	542 (6.5)	10 (2.3)	533 (8.9)	0 (0.0)	~ ~
Saudi Arabia	14 (2.5)	404 (13.4)	17 (3.3)	415 (11.2)	37 (3.8)	386 (7.5)	32 (3.7)	389 (6.9)
Singapore	68 (0.0)	613 (4.5)	28 (0.0)	607 (7.1)	4 (0.0)	625 (21.5)	0 (0.0)	~ ~
Slovenia	70 (4.1)	507 (2.4)	28 (4.1)	500 (4.6)	1 (1.1)	~ ~	0 (0.0)	~ ~
Sweden r	54 (4.3)	486 (2.8)	38 (4.3)	483 (3.5)	8 (2.6)	485 (7.5)	0 (0.0)	~ ~
Syrian Arab Republic	8 (2.4)	371 (18.7)	24 (4.0)	390 (10.9)	68 (3.9)	377 (4.7)	1 (0.7)	~ ~
Thailand	28 (3.4)	413 (7.9)	37 (4.1)	426 (10.1)	35 (4.2)	440 (9.0)	0 (0.0)	~ ~
Tunisia	5 (1.5)	399 (8.1)	10 (2.3)	426 (14.8)	86 (2.5)	427 (3.4)	0 (0.0)	~ ~
Turkey	16 (1.9)	440 (11.8)	33 (2.9)	463 (9.5)	41 (2.6)	449 (5.5)	10 (1.9)	442 (10.1)
Ukraine	35 (4.0)	466 (7.8)	39 (4.4)	478 (6.6)	25 (3.3)	499 (7.3)	1 (1.0)	~ ~
United Arab Emirates	37 (2.1)	457 (3.7)	41 (2.3)	449 (3.6)	21 (2.4)	469 (6.1)	1 (0.4)	~ ~
United States	58 (2.1)	512 (3.9)	32 (2.1)	507 (5.1)	9 (1.2)	511 (11.7)	0 (0.0)	~ ~
International Avg.	40 (0.5)	472 (1.4)	28 (0.5)	472 (1.5)	28 (0.4)	467 (1.8)	4 (0.2)	396 (4.7)

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 5.15: Schools with Computers Available for Instruction (Continued)

TIMSS 2011 Mathematics 8th Grade

Country	1 Computer for 1–2 Students		1 Computer for 3–5 Students		1 Computer for 6 or More Students		No Computers Available	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Ninth Grade Participants								
Botswana	8 (2.1)	411 (17.1)	11 (2.4)	408 (4.7)	76 (3.2)	394 (2.8)	5 (2.0)	407 (14.5)
Honduras	23 (3.2)	359 (13.6)	20 (4.0)	333 (8.8)	22 (3.4)	340 (5.9)	35 (4.4)	323 (5.3)
South Africa	15 (1.9)	382 (11.4)	9 (1.8)	408 (15.9)	30 (3.8)	347 (6.3)	46 (4.1)	336 (3.7)
Benchmarking Participants								
Alberta, Canada	90 (2.9)	506 (3.0)	10 (2.8)	510 (6.0)	1 (0.0)	~ ~	0 (0.0)	~ ~
Ontario, Canada	62 (3.9)	509 (3.4)	27 (4.1)	517 (6.0)	11 (2.8)	510 (7.7)	0 (0.0)	~ ~
Quebec, Canada	51 (4.4)	533 (3.7)	35 (4.4)	530 (5.5)	14 (3.0)	539 (9.4)	0 (0.0)	~ ~
Abu Dhabi, UAE	36 (3.5)	450 (6.9)	42 (4.5)	445 (6.5)	20 (4.1)	452 (11.5)	2 (1.1)	~ ~
Dubai, UAE r	45 (0.5)	482 (4.2)	32 (0.4)	467 (3.3)	23 (0.5)	501 (4.2)	0 (0.0)	~ ~
Alabama, US r	63 (6.9)	464 (9.0)	31 (6.8)	474 (15.8)	6 (3.7)	463 (16.8)	0 (0.0)	~ ~
California, US r	26 (6.9)	489 (10.7)	43 (6.5)	497 (9.0)	31 (5.9)	487 (13.1)	0 (0.0)	~ ~
Colorado, US	72 (6.1)	515 (5.9)	24 (5.9)	523 (14.0)	4 (3.0)	511 (64.3)	0 (0.0)	~ ~
Connecticut, US r	59 (7.1)	508 (9.6)	38 (7.1)	527 (12.5)	3 (2.5)	484 (6.6)	0 (0.0)	~ ~
Florida, US	51 (7.1)	504 (11.3)	37 (6.3)	518 (10.6)	12 (4.7)	535 (22.3)	0 (0.0)	~ ~
Indiana, US r	81 (6.4)	520 (6.3)	19 (6.4)	535 (16.8)	0 (0.0)	~ ~	0 (0.0)	~ ~
Massachusetts, US	51 (7.2)	548 (8.3)	45 (6.7)	576 (7.4)	4 (3.0)	574 (89.9)	0 (0.0)	~ ~
Minnesota, US	62 (7.7)	540 (7.2)	36 (7.4)	556 (7.2)	2 (2.2)	~ ~	0 (0.0)	~ ~
North Carolina, US	51 (6.9)	541 (9.6)	38 (7.3)	530 (14.8)	11 (4.5)	548 (25.0)	0 (0.0)	~ ~

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

The number of students per computer was calculated by dividing the number of students by the number of computers.

1) **What is the total enrollment of eighth grade students in your school as of the first day of the month TIMSS 2011 testing begins?**

2) **What is the total number of computers that can be used for instructional purposes by eighth grade students?**

Chapter 6



School Climate

Students with the highest mathematics achievement typically attend schools that emphasize academic success, as indicated by rigorous curricular goals, effective teachers, students that desire to do well, and parental support. In contrast, schools with discipline and safety problems are not conducive to high achievement. Students that attended schools with disorderly environments and reported more frequent bullying had much lower achievement than their counterparts in safe and orderly schools.

The school's educational values are reflected by the teachers, school leadership, the students themselves, and their parents. A school with a positive atmosphere toward high achievement and a rigorous academic program can overcome resource shortages and encourage students toward excellent performance. By contrast, a school with more disciplinary problems is not conducive to higher student achievement. When students are fearful and worried about their safety, for example, it is difficult to focus on academics. Chapter 6 presents the TIMSS 2011 results about positive and negative aspects of the atmosphere in schools around the world.

Schools Emphasize Academic Success

Studies of academic optimism show that a positive school atmosphere emphasizing academic achievement can even overcome socioeconomic disadvantages (McGuigan & Hoy, 2006). There are several dimensions of academic optimism, including a school communicating its academic emphasis through clear and rigorous academic goals. However, because individuals are the actors within schools, the effect on achievement is greatest when there is a collective influence. This includes a school administration and teachers that support and trust in students' achievement. In addition to making it clear that academic success is important, principals and teachers need to emphasize it can be achieved. Parents' support for their children's learning also contributes to a schools' collective efficacy or belief that the school's academic goals can be implemented.

School Emphasis on Academic Success

The TIMSS 2011 School Emphasis on Academic Success scale characterizes five aspects of academic optimism:

- Teachers' understanding of the school's curricular goals;
- Teachers' degree of success in implementing the school's curriculum;
- Teachers' expectations for student achievement;
- Parental support for student achievement; and
- Students' desire to do well in school.

This set of questions was given to both students' principals and teachers, with the respective responses used to create scales.

Exhibit 6.1 shows the principals' reports on the School Emphasis on Academic Success scale for the TIMSS 2011 fourth grade assessment. As might be anticipated, principals had very positive attitudes about the emphasis on

academics in their schools, so the three regions of the scale have been described as **Very High**, **High**, and **Medium**. Students were scored according to their principals' characterization of their school in terms of the five aspects. Students in schools with **Very High Emphasis** on academic success had principals characterizing three of the five aspects as "very high" and the other two as "high," on average. Students in **Medium Emphasis** schools had principals characterizing three of the five aspects as "medium" and the other two as "high," on average. All other students attended schools with a **High Emphasis** on academic success.

On average, across the fourth grade countries, 8 percent of the students attended schools where the principal reported a **Very High Emphasis** on academic success, 58 percent a school with a **High Emphasis**, and 34 percent a school with a **Medium Emphasis**. Although the results were not entirely consistent from country to country, internationally at the fourth grade, on average, there was a direct correspondence between average mathematics achievement and principals' reports, with higher emphasis on academic success related to higher average mathematics achievement. The results were similar for the sixth grade and benchmarking participants.

Exhibit 6.2 shows the principals' reports on the School Emphasis on Academic Success scale for the TIMSS 2011 eighth grade assessment. Although similar to the fourth grade results, principals of the eighth grade schools reported slightly less emphasis on academic success, with 7 percent of the students attending a school where the principal reported a **Very High Emphasis** on academic success, 53 percent a school with a **High Emphasis**, and 41 percent a school with a **Medium Emphasis** (compared to 8%, 58%, and 34%, respectively, at the fourth grade). There was also a somewhat greater difference in average mathematics achievement (46 points) between students attending **Very High Emphasis** schools and students attending **Medium Emphasis** schools (495 vs. 449).

Exhibits 6.3 and 6.4 show the teachers' reports on the School Emphasis on Academic Success scale for the fourth and eighth grade assessments, respectively. The teachers' reports were remarkably similar to those of the principals for both assessments, and with each reported decrease in academic emphasis, the students had progressively lower average mathematics achievement. Similar to their principals, the eighth grade mathematics teachers reported a little less emphasis on academic success than the fourth grade teachers, but the achievement gap between students in very high and medium emphasis schools was greater at the eighth grade (54 points) than at the fourth grade (26 points).

Exhibit 6.1: School Emphasis on Academic Success - Principal Reports

TIMSS 2011 Mathematics 4th Grade

Reported by Principals

Students were scored according to their principals' responses characterizing five aspects on the *School Emphasis on Academic Success* scale. Students in schools where their principals reported a **Very High Emphasis** on academic success had a score on the scale of at least 13.1, which corresponds to their principals characterizing three of the five aspects as "very high" and the other two as "high," on average. Students in schools with a **Medium Emphasis** on academic success had a score no higher than 8.9, which corresponds to their principals characterizing three of the five aspects as "medium" and the other two as "high," on average. All other students attended schools with a **High Emphasis** on academic success.

Country	Very High Emphasis		High Emphasis		Medium Emphasis		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Northern Ireland	33 (4.2)	577 (4.9)	60 (4.3)	558 (4.1)	7 (2.5)	540 (13.6)	12.0 (0.19)
Qatar	31 (2.9)	435 (10.3)	54 (3.2)	411 (5.3)	15 (2.4)	374 (8.2)	11.6 (0.14)
Ireland	28 (4.0)	543 (4.8)	67 (3.9)	523 (3.7)	4 (1.7)	508 (9.6)	11.9 (0.17)
United States	22 (2.5)	561 (4.4)	60 (2.7)	543 (2.9)	18 (2.1)	519 (4.7)	11.2 (0.13)
New Zealand	22 (3.0)	506 (4.7)	67 (3.3)	487 (3.4)	11 (2.1)	448 (11.0)	11.5 (0.14)
Korea, Rep. of	22 (3.5)	612 (4.4)	58 (4.3)	606 (2.7)	20 (3.4)	594 (3.3)	11.1 (0.19)
United Arab Emirates	21 (1.6)	463 (5.7)	61 (2.0)	429 (3.4)	18 (1.7)	401 (6.2)	11.2 (0.09)
Chinese Taipei	17 (3.0)	592 (5.7)	71 (3.7)	592 (2.4)	12 (2.5)	584 (4.6)	11.3 (0.15)
Australia	16 (3.0)	544 (7.6)	64 (3.8)	519 (3.7)	21 (3.0)	488 (5.6)	10.9 (0.14)
Malta	13 (0.1)	507 (3.8)	69 (0.1)	502 (1.5)	18 (0.1)	466 (3.1)	11.1 (0.00)
Bahrain	11 (2.5)	483 (9.7)	68 (3.7)	433 (4.6)	21 (2.8)	418 (7.6)	10.6 (0.16)
England	10 (2.9)	554 (6.0)	72 (4.7)	546 (4.9)	17 (3.8)	517 (9.9)	10.8 (0.18)
Iran, Islamic Rep. of	9 (2.0)	442 (14.6)	70 (3.4)	436 (4.6)	21 (2.7)	408 (6.1)	10.6 (0.12)
Saudi Arabia	9 (2.7)	453 (23.3)	59 (4.1)	412 (4.4)	32 (3.4)	394 (11.2)	10.2 (0.18)
Croatia	9 (2.5)	499 (6.4)	70 (3.8)	492 (2.2)	21 (3.4)	479 (5.2)	10.7 (0.14)
Sweden	9 (2.7)	522 (10.0)	59 (4.8)	505 (2.8)	32 (4.9)	497 (3.8)	10.3 (0.17)
Kuwait	9 (2.0)	349 (12.4)	65 (3.8)	348 (4.5)	27 (3.8)	327 (6.9)	10.4 (0.17)
Oman	9 (1.8)	376 (7.9)	73 (3.0)	383 (3.9)	18 (2.2)	362 (6.5)	10.6 (0.10)
Austria	8 (2.1)	511 (8.5)	75 (4.4)	511 (2.4)	17 (3.9)	493 (7.4)	10.4 (0.14)
Singapore	8 (0.0)	627 (12.2)	62 (0.0)	610 (4.3)	31 (0.0)	591 (6.3)	10.2 (0.00)
Finland	6 (1.9)	561 (2.1)	71 (4.2)	548 (2.5)	24 (4.2)	536 (5.9)	10.4 (0.16)
Lithuania	6 (2.0)	547 (13.2)	65 (3.6)	541 (3.0)	29 (3.4)	517 (5.6)	10.0 (0.13)
Kazakhstan	5 (1.9)	495 (26.2)	65 (4.4)	506 (6.3)	30 (4.1)	492 (8.5)	10.2 (0.12)
Chile	5 (1.9)	516 (17.1)	30 (3.3)	481 (5.8)	65 (3.8)	452 (4.2)	8.8 (0.19)
Denmark r	5 (1.3)	543 (4.5)	65 (3.6)	539 (3.6)	30 (3.3)	540 (3.9)	10.1 (0.11)
Portugal	4 (2.0)	543 (8.6)	64 (5.0)	537 (4.9)	31 (4.5)	522 (6.5)	10.0 (0.13)
Azerbaijan	4 (1.7)	478 (15.9)	44 (3.8)	467 (10.9)	53 (3.8)	456 (6.3)	9.2 (0.15)
Romania	4 (1.6)	547 (13.3)	55 (4.1)	495 (6.8)	41 (4.1)	459 (9.7)	9.5 (0.15)
Poland	3 (1.6)	525 (20.1)	70 (3.5)	484 (2.6)	26 (3.7)	470 (4.1)	9.8 (0.15)
Morocco	3 (1.0)	408 (16.9)	25 (3.1)	357 (10.5)	72 (3.0)	325 (5.5)	8.0 (0.14)
Yemen	2 (1.2)	~ ~	35 (4.2)	260 (8.5)	62 (4.5)	242 (8.5)	8.7 (0.18)
Tunisia	2 (1.3)	~ ~	37 (4.3)	372 (5.6)	60 (4.2)	350 (5.0)	8.8 (0.16)
Spain	2 (1.3)	~ ~	58 (4.1)	491 (3.1)	40 (3.9)	471 (5.2)	9.6 (0.12)
Turkey	2 (1.0)	~ ~	33 (3.3)	493 (8.4)	65 (3.1)	455 (5.7)	8.6 (0.14)
Thailand	2 (1.1)	~ ~	52 (4.8)	463 (5.7)	46 (4.8)	449 (7.9)	9.5 (0.14)
Serbia	2 (1.2)	~ ~	52 (4.0)	521 (4.0)	46 (4.0)	507 (4.5)	9.4 (0.13)
Slovenia	2 (0.8)	~ ~	63 (2.9)	514 (2.8)	35 (3.1)	511 (3.1)	9.6 (0.10)
Russian Federation	2 (0.9)	~ ~	50 (4.4)	547 (5.1)	48 (4.3)	538 (4.5)	9.2 (0.11)
Hong Kong SAR	1 (0.9)	~ ~	60 (4.5)	602 (3.5)	38 (4.6)	601 (6.6)	9.7 (0.16)
Japan	1 (1.0)	~ ~	48 (4.5)	592 (2.7)	51 (4.5)	579 (2.7)	9.0 (0.16)
Italy	1 (0.8)	~ ~	52 (3.7)	507 (3.6)	46 (3.7)	508 (3.9)	9.4 (0.10)
Hungary	1 (0.9)	~ ~	49 (3.9)	537 (4.1)	50 (3.9)	495 (6.0)	9.0 (0.13)
Czech Republic	1 (0.9)	~ ~	45 (3.9)	513 (4.3)	54 (4.0)	509 (2.9)	8.9 (0.13)
Armenia	1 (0.8)	~ ~	56 (4.3)	457 (4.3)	43 (4.3)	446 (6.0)	9.6 (0.12)
Norway	1 (0.1)	~ ~	64 (4.7)	500 (3.5)	34 (4.7)	484 (3.9)	9.8 (0.13)
Germany	1 (0.8)	~ ~	66 (3.4)	537 (2.3)	33 (3.3)	512 (4.1)	9.9 (0.11)
Netherlands r	1 (1.0)	~ ~	50 (6.0)	544 (3.0)	49 (6.0)	538 (3.2)	9.3 (0.18)
Georgia	1 (0.9)	~ ~	46 (3.9)	457 (7.1)	53 (3.6)	443 (4.9)	9.1 (0.11)
Slovak Republic	1 (0.7)	~ ~	41 (3.4)	520 (4.7)	58 (3.4)	496 (5.3)	8.8 (0.10)
Belgium (Flemish)	1 (0.0)	~ ~	70 (3.7)	553 (2.2)	30 (3.7)	543 (3.8)	9.9 (0.11)
International Avg.	8 (0.3)	511 (2.2)	58 (0.5)	496 (0.7)	34 (0.5)	477 (0.9)	

Centerpoint of scale set at 10.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

TIMSS & PIRLS International Study Center
Lynch School of Education, Boston College

Exhibit 6.1: School Emphasis on Academic Success - Principal Reports (Continued)

Country	Very High Emphasis		High Emphasis		Medium Emphasis		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Sixth Grade Participants							
Honduras	10 (2.5)	385 (14.7)	61 (4.5)	395 (8.9)	29 (4.1)	403 (6.3)	10.2 (0.17)
Botswana	5 (1.8)	505 (24.5)	29 (3.8)	438 (8.1)	66 (4.1)	404 (3.7)	8.8 (0.18)
Yemen	2 (1.2)	~ ~	33 (4.2)	369 (9.0)	65 (4.2)	337 (7.1)	8.7 (0.17)
Benchmarking Participants							
Dubai, UAE	35 (0.3)	495 (3.1)	49 (0.5)	467 (2.3)	16 (0.4)	397 (5.2)	11.8 (0.01)
Alberta, Canada	31 (4.4)	515 (3.5)	58 (4.9)	507 (3.0)	12 (2.8)	490 (9.8)	11.8 (0.17)
Florida, US r	27 (5.0)	580 (6.7)	58 (5.3)	532 (4.4)	15 (4.4)	529 (7.2)	11.5 (0.27)
Abu Dhabi, UAE	17 (3.4)	435 (12.5)	68 (3.8)	413 (5.7)	15 (3.0)	393 (13.6)	11.0 (0.17)
Ontario, Canada	12 (2.9)	534 (6.5)	65 (4.3)	522 (3.8)	23 (4.1)	499 (4.2)	10.6 (0.20)
North Carolina, US	7 (4.2)	599 (6.9)	76 (7.1)	558 (5.3)	17 (5.6)	530 (9.0)	10.8 (0.27)
Quebec, Canada	5 (1.6)	563 (11.1)	75 (3.6)	535 (2.4)	21 (3.4)	519 (5.5)	10.4 (0.12)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

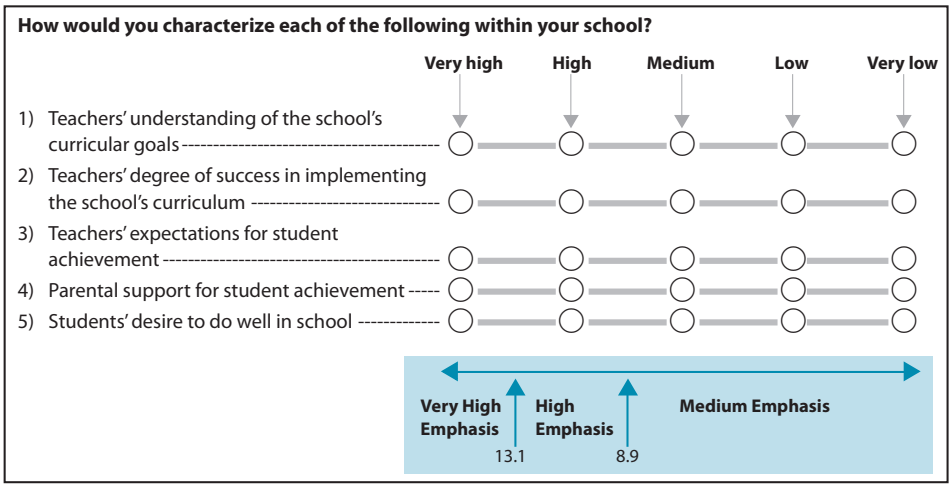


Exhibit 6.2: School Emphasis on Academic Success - Principal Reports

TIMSS 2011 Mathematics 8th Grade

Reported by Principals

Students were scored according to their principals' responses characterizing five aspects on the *School Emphasis on Academic Success* scale. Students in schools where their principals reported a **Very High Emphasis** on academic success had a score on the scale of at least 13.3, which corresponds to their principals characterizing three of the five aspects as "very high" and the other two as "high," on average. Students in schools with a **Medium Emphasis** on academic success had a score no higher than 9.2, which corresponds to their principals characterizing three of the five aspects as "medium" and the other two as "high," on average. All other students attended schools with a **High Emphasis** on academic success.

Country	Very High Emphasis		High Emphasis		Medium Emphasis		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Qatar	27 (0.3)	453 (4.6)	57 (0.3)	395 (5.0)	16 (0.1)	378 (5.7)	11.5 (0.02)
England	26 (3.5)	525 (12.3)	56 (4.7)	509 (8.2)	19 (3.4)	477 (14.7)	11.6 (0.18)
Australia	20 (2.7)	558 (15.8)	48 (3.8)	509 (5.9)	32 (3.1)	476 (7.4)	10.8 (0.16)
New Zealand	19 (3.8)	524 (9.2)	61 (4.9)	484 (7.1)	20 (3.3)	467 (6.7)	11.1 (0.15)
United Arab Emirates	17 (1.6)	497 (6.5)	63 (2.0)	453 (2.7)	20 (1.8)	426 (4.7)	11.1 (0.09)
Korea, Rep. of	16 (3.2)	637 (7.3)	56 (4.3)	613 (3.8)	28 (3.6)	597 (3.8)	10.7 (0.19)
United States	15 (2.0)	532 (8.0)	61 (2.7)	515 (3.7)	24 (2.1)	486 (5.4)	10.9 (0.09)
Chinese Taipei	12 (2.8)	657 (15.1)	81 (3.3)	605 (3.8)	7 (1.7)	579 (7.7)	11.4 (0.11)
Iran, Islamic Rep. of	12 (2.5)	462 (15.1)	62 (3.6)	418 (6.4)	27 (2.6)	387 (5.7)	10.7 (0.13)
Singapore	11 (0.0)	651 (11.2)	60 (0.0)	614 (4.2)	29 (0.0)	586 (7.8)	10.8 (0.00)
Israel	9 (2.4)	515 (18.7)	75 (3.6)	529 (5.1)	17 (3.0)	471 (13.6)	11.0 (0.13)
Indonesia	8 (2.2)	417 (18.8)	60 (4.8)	387 (6.7)	32 (4.4)	377 (5.9)	10.4 (0.16)
Oman	7 (1.4)	407 (10.7)	67 (2.8)	373 (3.8)	25 (2.6)	332 (4.7)	10.5 (0.10)
Saudi Arabia	7 (2.3)	442 (17.8)	48 (4.5)	396 (6.4)	45 (4.1)	383 (7.6)	9.9 (0.16)
Ghana	6 (1.7)	374 (8.7)	53 (4.6)	337 (7.0)	41 (4.3)	315 (5.7)	10.0 (0.13)
Malaysia	6 (1.9)	467 (25.6)	65 (3.1)	453 (6.7)	29 (2.7)	405 (8.4)	10.4 (0.12)
Kazakhstan	5 (1.8)	513 (22.8)	60 (4.2)	483 (6.3)	35 (4.1)	489 (6.8)	10.2 (0.13)
Jordan	5 (1.6)	439 (10.9)	56 (3.5)	415 (5.1)	39 (3.6)	389 (5.6)	10.0 (0.14)
Chile	5 (1.8)	467 (11.9)	27 (3.3)	451 (5.4)	68 (3.3)	401 (3.7)	8.7 (0.17)
Sweden r	5 (2.1)	488 (5.5)	62 (4.6)	491 (3.0)	34 (4.4)	475 (3.6)	10.3 (0.15)
Romania	4 (1.6)	531 (18.0)	55 (4.6)	473 (6.3)	41 (4.6)	432 (6.9)	9.8 (0.16)
Finland	4 (1.8)	530 (8.2)	71 (4.1)	517 (2.8)	25 (3.9)	501 (4.3)	10.4 (0.13)
Syrian Arab Republic	4 (1.7)	350 (20.6)	39 (3.7)	394 (6.1)	57 (3.9)	373 (5.8)	9.3 (0.19)
Bahrain	4 (0.1)	522 (8.0)	57 (0.3)	425 (2.4)	40 (0.3)	375 (3.3)	10.3 (0.01)
Macedonia, Rep. of	3 (1.1)	439 (18.9)	64 (3.6)	440 (6.1)	33 (3.7)	403 (11.7)	10.2 (0.15)
Morocco	3 (0.9)	450 (28.5)	26 (2.7)	393 (5.5)	71 (2.7)	360 (2.5)	8.7 (0.12)
Hong Kong SAR	3 (1.6)	662 (40.2)	51 (4.1)	608 (5.9)	47 (4.3)	554 (7.7)	9.8 (0.15)
Palestinian Nat'l Auth.	3 (1.4)	404 (10.8)	52 (4.1)	408 (5.0)	46 (4.2)	400 (6.5)	9.7 (0.14)
Thailand	3 (1.4)	445 (17.9)	47 (3.9)	436 (8.2)	50 (4.1)	418 (6.2)	9.7 (0.15)
Lebanon	2 (1.2)	~ ~	59 (4.1)	467 (5.4)	39 (3.9)	424 (5.0)	9.8 (0.16)
Slovenia	2 (1.1)	~ ~	62 (3.4)	508 (2.8)	35 (3.5)	499 (4.4)	9.8 (0.12)
Turkey	2 (0.9)	~ ~	33 (3.1)	495 (8.8)	65 (3.0)	429 (4.5)	8.9 (0.11)
Norway	2 (1.1)	~ ~	63 (4.6)	479 (3.3)	35 (4.5)	466 (3.3)	10.1 (0.13)
Lithuania	2 (1.1)	~ ~	56 (3.9)	512 (3.8)	42 (3.9)	489 (5.0)	9.7 (0.12)
Japan	2 (1.1)	~ ~	52 (4.4)	580 (4.0)	47 (4.3)	556 (3.8)	9.7 (0.14)
Hungary	1 (1.0)	~ ~	48 (4.2)	524 (4.1)	51 (4.1)	486 (6.0)	9.3 (0.15)
Tunisia	1 (0.4)	~ ~	18 (3.1)	443 (10.4)	82 (3.0)	421 (3.0)	8.0 (0.14)
Italy	0 (0.0)	~ ~	47 (3.6)	502 (3.6)	53 (3.6)	495 (4.0)	9.4 (0.13)
Armenia	0 (0.0)	~ ~	41 (4.2)	479 (5.3)	59 (4.2)	459 (4.5)	9.3 (0.10)
Georgia	0 (0.0)	~ ~	30 (3.3)	450 (10.7)	70 (3.3)	424 (4.5)	8.7 (0.11)
Russian Federation	0 (0.0)	~ ~	28 (3.0)	563 (7.8)	72 (3.0)	530 (4.0)	8.8 (0.08)
Ukraine	0 (0.0)	~ ~	31 (3.5)	505 (6.2)	69 (3.5)	468 (4.5)	9.0 (0.10)
International Avg.	7 (0.3)	495 (3.1)	53 (0.6)	477 (0.9)	41 (0.5)	449 (1.0)	

Centerpoint of scale set at 10.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 6.2: School Emphasis on Academic Success - Principal Reports (Continued)

TIMSS 2011 Mathematics 8th Grade

Country	Very High Emphasis		High Emphasis		Medium Emphasis		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Ninth Grade Participants							
South Africa	4 (1.0)	470 (45.6)	31 (3.1)	371 (7.6)	66 (3.0)	335 (3.2)	8.9 (0.12)
Honduras	2 (1.0)	~ ~	52 (4.6)	340 (6.3)	47 (4.7)	333 (5.8)	9.4 (0.18)
Botswana	1 (0.8)	~ ~	20 (3.2)	416 (7.0)	79 (3.2)	389 (2.7)	8.2 (0.13)
Benchmarking Participants							
Dubai, UAE	28 (0.4)	519 (5.2)	59 (0.4)	470 (2.6)	13 (0.3)	418 (5.4)	11.8 (0.02)
Massachusetts, US	27 (6.1)	576 (12.9)	51 (6.7)	556 (9.3)	22 (5.8)	546 (14.3)	11.4 (0.34)
Connecticut, US r	22 (5.6)	542 (17.4)	54 (6.9)	531 (10.5)	24 (5.7)	471 (13.3)	11.2 (0.29)
Alberta, Canada	19 (3.1)	521 (7.5)	68 (4.0)	504 (2.9)	13 (2.7)	493 (5.5)	11.5 (0.15)
Colorado, US	18 (4.6)	546 (10.0)	52 (7.2)	520 (8.5)	30 (5.7)	495 (15.7)	10.9 (0.26)
California, US r	14 (3.0)	542 (11.7)	63 (5.9)	492 (7.5)	23 (4.9)	462 (10.1)	10.8 (0.21)
Indiana, US r	13 (5.6)	537 (16.5)	68 (7.0)	522 (7.8)	18 (5.5)	524 (10.6)	11.1 (0.32)
Abu Dhabi, UAE	13 (3.4)	495 (17.5)	64 (4.4)	449 (4.7)	22 (3.9)	422 (6.0)	10.9 (0.18)
Ontario, Canada	13 (3.1)	520 (6.5)	62 (4.4)	517 (2.9)	25 (3.6)	494 (6.9)	10.7 (0.17)
Minnesota, US	12 (5.1)	544 (33.9)	68 (6.0)	549 (5.8)	20 (5.4)	537 (10.7)	11.1 (0.24)
Alabama, US r	11 (2.8)	512 (27.1)	56 (9.0)	469 (8.2)	33 (9.0)	447 (10.0)	10.6 (0.27)
Florida, US	10 (4.9)	502 (39.8)	66 (8.2)	518 (9.5)	24 (6.9)	502 (10.6)	10.6 (0.31)
North Carolina, US	9 (4.2)	549 (12.7)	46 (7.4)	549 (10.4)	45 (6.6)	520 (11.4)	10.1 (0.25)
Quebec, Canada	7 (1.8)	576 (8.5)	62 (4.1)	537 (3.1)	31 (3.7)	512 (5.0)	10.4 (0.13)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

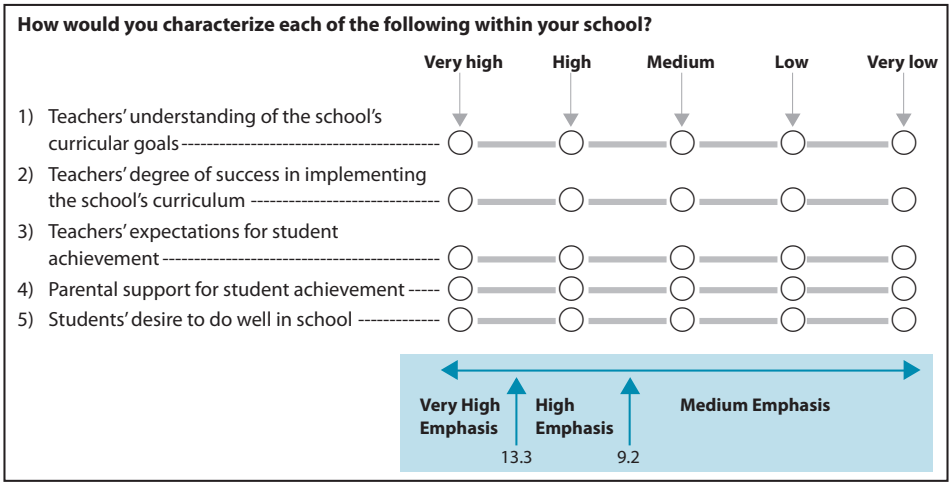


Exhibit 6.3: School Emphasis on Academic Success - Teacher Reports

TIMSS 2011 4th Grade Mathematics

Reported by Teachers

Students were scored according to their teachers' responses characterizing five aspects on the *School Emphasis on Academic Success* scale. Students in schools where their teachers reported a **Very High Emphasis** on academic success had a score on the scale of at least 13.1, which corresponds to their teachers characterizing three of the five aspects as "very high" and the other two as "high," on average. Students in schools with a **Medium Emphasis** on academic success had a score no higher than 8.8, which corresponds to their teachers characterizing three of the five aspects as "medium" and the other two as "high," on average. All other students attended schools with a **High Emphasis** on academic success.

Country	Very High Emphasis		High Emphasis		Medium Emphasis		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Northern Ireland r	31 (4.3)	573 (6.9)	65 (4.4)	559 (4.6)	5 (1.6)	550 (10.5)	11.9 (0.17)
Ireland	22 (3.4)	546 (5.1)	70 (3.5)	526 (3.6)	8 (1.8)	494 (7.6)	11.5 (0.15)
Croatia	21 (3.0)	490 (3.6)	69 (3.6)	489 (2.3)	10 (2.2)	496 (6.7)	11.4 (0.12)
United States	18 (2.1)	560 (4.6)	66 (2.5)	545 (2.2)	16 (1.8)	515 (5.1)	11.0 (0.10)
Korea, Rep. of	17 (3.4)	618 (5.8)	65 (3.8)	605 (2.4)	18 (3.5)	593 (3.3)	10.9 (0.19)
Australia r	16 (3.0)	550 (12.3)	63 (4.2)	519 (4.4)	20 (3.0)	495 (5.8)	10.8 (0.16)
England	16 (3.0)	563 (7.5)	67 (4.5)	546 (4.7)	17 (3.4)	522 (9.0)	11.1 (0.16)
United Arab Emirates	15 (1.8)	464 (7.6)	66 (2.5)	436 (2.3)	19 (2.1)	409 (8.2)	10.9 (0.10)
New Zealand	14 (2.0)	509 (8.0)	69 (2.8)	487 (3.0)	17 (2.5)	465 (5.5)	10.9 (0.11)
Kazakhstan	12 (2.3)	489 (10.9)	68 (3.4)	504 (5.8)	20 (2.9)	502 (9.6)	10.7 (0.13)
Qatar	11 (2.6)	439 (21.8)	63 (4.8)	414 (5.5)	25 (4.5)	397 (10.1)	10.6 (0.19)
Malta	11 (0.1)	515 (2.7)	70 (0.1)	498 (1.7)	19 (0.1)	477 (2.7)	10.5 (0.00)
Saudi Arabia	11 (2.4)	440 (11.1)	63 (3.8)	419 (6.9)	26 (3.3)	377 (9.7)	10.4 (0.15)
Bahrain	9 (3.0)	499 (14.6)	63 (5.2)	435 (5.5)	28 (4.1)	418 (3.9)	10.3 (0.17)
Iran, Islamic Rep. of	9 (1.8)	452 (13.3)	68 (3.5)	436 (5.1)	23 (3.0)	404 (6.6)	10.5 (0.13)
Romania	9 (2.3)	476 (22.8)	61 (3.7)	498 (5.7)	30 (3.3)	449 (11.6)	10.2 (0.16)
Kuwait	9 (2.4)	343 (14.9)	65 (3.8)	342 (4.1)	26 (3.4)	340 (6.5)	10.2 (0.14)
Austria	8 (1.9)	521 (5.4)	74 (2.8)	510 (3.2)	18 (2.5)	495 (5.7)	10.4 (0.13)
Denmark	8 (2.2)	553 (6.9)	69 (3.4)	543 (2.8)	23 (2.9)	528 (5.2)	10.3 (0.11)
Oman	8 (1.6)	414 (7.9)	65 (2.8)	390 (3.4)	27 (2.6)	365 (5.3)	10.2 (0.10)
Azerbaijan	8 (2.1)	488 (24.2)	39 (3.5)	468 (8.0)	53 (3.5)	458 (6.8)	9.5 (0.14)
Chinese Taipei	7 (1.9)	589 (8.1)	67 (3.8)	594 (2.4)	26 (3.6)	585 (4.8)	10.1 (0.16)
Poland	7 (2.0)	479 (6.4)	76 (3.2)	483 (2.6)	17 (2.8)	472 (3.8)	10.3 (0.12)
Spain	7 (2.1)	496 (7.0)	54 (4.4)	495 (3.0)	39 (4.1)	462 (4.1)	9.7 (0.16)
Sweden r	7 (1.7)	532 (6.4)	63 (4.3)	508 (2.7)	31 (4.3)	491 (4.3)	10.0 (0.16)
Chile	6 (2.0)	524 (8.0)	43 (3.7)	473 (4.5)	51 (4.0)	445 (4.9)	9.2 (0.16)
Serbia	5 (1.9)	558 (13.6)	69 (3.6)	521 (3.5)	25 (3.3)	493 (7.2)	10.1 (0.13)
Portugal	4 (1.7)	581 (17.2)	56 (4.7)	540 (3.3)	40 (4.6)	516 (6.0)	9.9 (0.18)
Finland	4 (1.6)	550 (9.8)	63 (3.2)	550 (2.4)	33 (3.4)	537 (4.3)	9.9 (0.12)
Turkey	4 (1.1)	532 (11.2)	39 (3.3)	490 (9.3)	57 (3.3)	450 (5.1)	8.8 (0.14)
Lithuania	3 (1.0)	532 (11.9)	74 (3.2)	536 (3.4)	23 (3.2)	526 (4.9)	10.2 (0.09)
Thailand	3 (1.4)	436 (8.6)	55 (4.2)	469 (6.5)	42 (4.3)	448 (7.8)	9.5 (0.16)
Singapore	3 (1.0)	619 (22.8)	61 (2.5)	610 (4.4)	36 (2.5)	597 (5.2)	9.6 (0.10)
Georgia	3 (1.2)	474 (21.5)	59 (4.0)	459 (4.4)	38 (4.0)	435 (6.9)	9.7 (0.13)
Armenia	3 (1.2)	452 (23.8)	57 (3.2)	458 (4.3)	40 (3.2)	445 (5.6)	9.6 (0.12)
Yemen	3 (1.5)	254 (89.1)	39 (4.5)	248 (9.7)	58 (4.4)	245 (7.6)	8.9 (0.18)
Hong Kong SAR	2 (1.3)	~ ~	73 (4.0)	606 (3.7)	25 (3.9)	590 (9.5)	9.9 (0.14)
Morocco	2 (0.8)	~ ~	16 (2.3)	382 (13.8)	82 (2.2)	328 (5.2)	7.6 (0.12)
Belgium (Flemish)	2 (1.1)	~ ~	67 (3.4)	554 (2.1)	31 (3.3)	539 (3.8)	9.8 (0.10)
Slovenia	2 (1.1)	~ ~	66 (3.7)	516 (2.7)	32 (3.5)	506 (3.2)	9.7 (0.10)
Czech Republic	2 (0.9)	~ ~	43 (4.5)	513 (3.3)	55 (4.5)	508 (3.6)	9.0 (0.14)
Tunisia	2 (0.8)	~ ~	42 (3.3)	371 (6.3)	57 (3.2)	349 (5.1)	8.9 (0.15)
Japan	1 (0.8)	~ ~	57 (3.5)	589 (2.1)	42 (3.5)	581 (2.6)	9.4 (0.12)
Norway	1 (0.7)	~ ~	74 (4.2)	496 (3.1)	24 (4.1)	488 (6.0)	9.9 (0.14)
Italy	1 (0.4)	~ ~	56 (3.8)	512 (3.6)	43 (3.9)	504 (4.1)	9.3 (0.12)
Germany	1 (0.8)	~ ~	61 (3.7)	540 (2.1)	38 (3.8)	510 (3.5)	9.4 (0.11)
Hungary	1 (0.7)	~ ~	59 (3.5)	533 (3.8)	40 (3.5)	486 (6.1)	9.4 (0.13)
Slovak Republic	1 (0.4)	~ ~	51 (3.5)	514 (3.4)	48 (3.5)	498 (6.0)	9.2 (0.12)
Russian Federation	1 (0.0)	~ ~	52 (3.9)	544 (3.7)	47 (4.0)	539 (5.9)	9.3 (0.12)
Netherlands r	0 (0.0)	~ ~	40 (4.2)	545 (3.9)	60 (4.2)	535 (2.7)	9.0 (0.13)
International Avg.	7 (0.3)	503 (3.3)	60 (0.5)	496 (0.7)	33 (0.5)	477 (0.9)	

Centerpoint of scale set at 10.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 6.3: School Emphasis on Academic Success - Teacher Reports (Continued)

Country	Very High Emphasis		High Emphasis		Medium Emphasis		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Sixth Grade Participants							
Honduras	12 (3.0)	438 (18.2)	52 (4.4)	397 (6.5)	37 (4.4)	382 (9.4)	10.2 (0.21)
Botswana	4 (2.0)	503 (31.9)	35 (4.1)	432 (6.8)	61 (4.0)	408 (4.7)	8.9 (0.18)
Yemen	2 (1.2)	~ ~	43 (4.4)	355 (9.1)	55 (4.5)	341 (7.7)	8.8 (0.17)
Benchmarking Participants							
Dubai, UAE	24 (2.3)	505 (6.4)	63 (2.7)	465 (3.4)	14 (1.4)	437 (12.0)	11.2 (0.07)
Florida, US r	20 (4.3)	563 (9.8)	59 (4.1)	542 (4.4)	22 (3.5)	531 (6.1)	10.9 (0.27)
Alberta, Canada r	18 (4.1)	508 (6.1)	70 (3.7)	511 (2.9)	11 (2.7)	478 (10.5)	11.2 (0.17)
Abu Dhabi, UAE	13 (3.0)	441 (15.4)	66 (4.1)	421 (4.4)	20 (4.2)	394 (15.9)	11.0 (0.18)
Ontario, Canada	11 (2.3)	531 (7.7)	62 (3.7)	522 (3.3)	26 (3.4)	507 (6.3)	10.4 (0.16)
North Carolina, US	7 (3.1)	587 (18.1)	67 (4.6)	554 (5.1)	25 (5.2)	539 (6.4)	10.3 (0.24)
Quebec, Canada	5 (1.9)	555 (11.7)	67 (4.1)	535 (2.8)	28 (4.1)	523 (3.6)	10.2 (0.15)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

How would you characterize each of the following within your school?

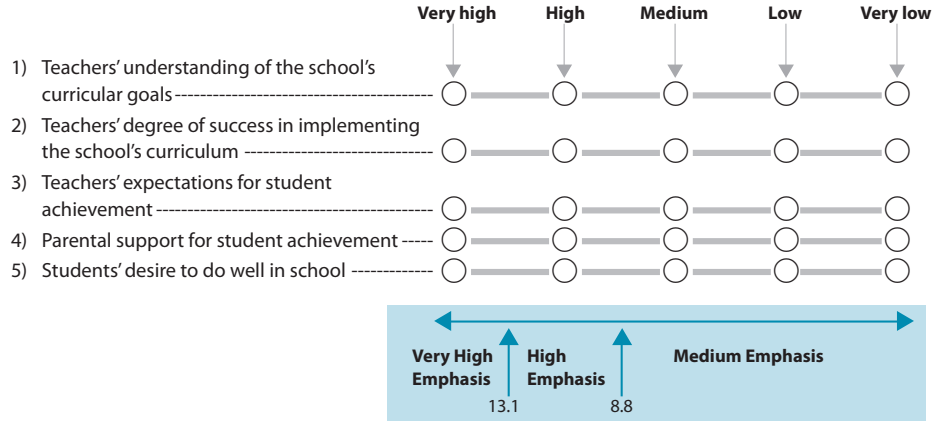


Exhibit 6.4: School Emphasis on Academic Success - Teacher Reports

TIMSS 2011 Mathematics 8th Grade

Reported by Teachers

Students were scored according to their teachers' responses characterizing five aspects on the *School Emphasis on Academic Success* scale. Students in schools where their teachers reported a **Very High Emphasis** on academic success had a score on the scale of at least 13.6, which corresponds to their teachers characterizing three of the five aspects as "very high" and the other two as "high," on average. Students in schools with a **Medium Emphasis** on academic success had a score no higher than 9.5, which corresponds to their teachers characterizing three of the five aspects as "medium" and the other two as "high," on average. All other students attended schools with a **High Emphasis** on academic success.

Country	Very High Emphasis		High Emphasis		Medium Emphasis		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Qatar	19 (4.2)	440 (15.5)	54 (4.5)	413 (6.0)	27 (3.2)	380 (8.4)	11.4 (0.17)
England	16 (2.4)	526 (11.0)	59 (4.1)	508 (7.3)	24 (3.9)	488 (12.2)	11.2 (0.19)
United States r	13 (2.0)	538 (10.1)	55 (2.6)	517 (4.9)	32 (2.4)	494 (4.7)	10.8 (0.12)
Australia r	13 (2.4)	569 (15.2)	50 (3.7)	515 (7.7)	37 (3.9)	475 (7.5)	10.4 (0.17)
United Arab Emirates	11 (1.6)	500 (9.0)	62 (2.3)	457 (2.5)	26 (2.2)	430 (4.2)	11.0 (0.09)
Chinese Taipei	11 (2.2)	659 (11.6)	63 (3.7)	612 (4.7)	26 (3.3)	583 (5.7)	11.0 (0.12)
Israel	10 (2.1)	561 (13.3)	61 (3.1)	528 (5.1)	29 (2.6)	485 (9.4)	10.8 (0.12)
Malaysia	9 (2.1)	473 (19.9)	59 (4.1)	447 (6.7)	32 (3.9)	419 (9.1)	10.7 (0.16)
New Zealand	9 (2.1)	520 (17.4)	59 (3.4)	491 (6.8)	32 (3.2)	468 (9.6)	10.7 (0.16)
Indonesia	9 (3.0)	388 (15.9)	55 (4.4)	391 (6.2)	36 (4.3)	377 (8.2)	10.7 (0.17)
Saudi Arabia	8 (2.4)	406 (19.0)	54 (4.1)	406 (5.8)	38 (3.8)	376 (6.6)	10.5 (0.16)
Korea, Rep. of	8 (1.5)	624 (8.2)	56 (3.3)	615 (4.4)	36 (3.1)	605 (4.3)	10.4 (0.13)
Bahrain	5 (0.1)	505 (6.2)	43 (3.1)	428 (4.4)	52 (3.1)	384 (3.1)	9.9 (0.08)
Oman	5 (1.5)	417 (12.7)	54 (3.0)	385 (4.2)	41 (2.7)	334 (4.9)	10.1 (0.12)
Jordan	5 (1.9)	447 (17.2)	50 (4.2)	416 (5.5)	45 (3.8)	390 (6.1)	10.1 (0.14)
Iran, Islamic Rep. of	5 (1.8)	484 (19.9)	47 (3.5)	424 (6.5)	48 (3.4)	399 (5.7)	9.9 (0.15)
Japan	5 (1.9)	599 (14.3)	52 (4.2)	578 (3.9)	43 (4.2)	557 (3.5)	10.0 (0.18)
Ghana	5 (1.7)	367 (23.9)	66 (3.8)	337 (5.8)	29 (3.6)	310 (5.0)	10.7 (0.14)
Turkey	4 (1.4)	586 (37.4)	27 (3.0)	481 (7.5)	69 (3.1)	433 (4.1)	8.7 (0.17)
Romania	4 (1.6)	523 (18.8)	47 (3.7)	473 (6.1)	49 (3.6)	438 (6.4)	10.0 (0.13)
Kazakhstan	4 (1.6)	503 (23.5)	69 (3.8)	484 (5.7)	27 (3.6)	493 (6.7)	10.6 (0.11)
Lebanon	4 (1.5)	496 (8.9)	53 (4.2)	465 (5.9)	43 (4.0)	427 (4.6)	10.1 (0.17)
Macedonia, Rep. of r	4 (1.6)	420 (23.7)	45 (4.1)	435 (10.4)	51 (4.1)	414 (7.1)	9.8 (0.15)
Singapore	4 (1.1)	681 (12.8)	55 (2.6)	625 (5.1)	41 (2.4)	587 (6.2)	10.2 (0.09)
Sweden r	3 (1.4)	517 (13.6)	55 (3.7)	492 (2.9)	42 (3.5)	475 (2.9)	10.2 (0.13)
Norway	3 (1.4)	501 (5.4)	61 (4.4)	482 (2.7)	36 (4.4)	462 (3.3)	10.4 (0.12)
Syrian Arab Republic	3 (1.4)	409 (37.0)	45 (4.5)	386 (5.8)	52 (4.5)	371 (6.7)	9.7 (0.18)
Chile	3 (1.1)	498 (16.1)	30 (3.4)	441 (6.6)	67 (3.5)	403 (3.4)	9.0 (0.15)
Hong Kong SAR	2 (1.4)	~ ~	50 (4.5)	615 (6.6)	47 (4.3)	553 (6.9)	10.0 (0.15)
Morocco	2 (0.9)	~ ~	23 (2.8)	393 (5.9)	76 (3.0)	363 (2.1)	8.5 (0.14)
Lithuania	2 (0.9)	~ ~	60 (3.6)	508 (4.0)	38 (3.6)	493 (4.1)	10.1 (0.11)
Thailand	2 (1.1)	~ ~	44 (3.6)	442 (7.4)	55 (3.7)	415 (5.8)	9.7 (0.13)
Palestinian Nat'l Auth.	1 (1.0)	~ ~	51 (4.3)	406 (4.9)	47 (4.1)	403 (5.8)	9.8 (0.12)
Finland	1 (0.9)	~ ~	51 (3.7)	518 (3.4)	47 (3.8)	510 (2.8)	10.1 (0.11)
Slovenia	1 (0.5)	~ ~	47 (3.0)	510 (2.9)	52 (3.0)	500 (2.7)	9.7 (0.09)
Hungary	1 (0.5)	~ ~	42 (3.7)	529 (5.3)	57 (3.7)	486 (5.1)	9.4 (0.13)
Georgia	0 (0.4)	~ ~	22 (3.5)	447 (10.7)	77 (3.5)	426 (4.2)	8.9 (0.11)
Tunisia	0 (0.2)	~ ~	24 (3.1)	437 (7.9)	76 (3.1)	421 (2.9)	8.7 (0.12)
Armenia	0 (0.0)	~ ~	26 (3.4)	482 (6.7)	74 (3.4)	460 (3.5)	9.0 (0.12)
Russian Federation	0 (0.2)	~ ~	31 (3.4)	568 (6.0)	69 (3.4)	527 (4.2)	9.0 (0.11)
Italy	0 (0.0)	~ ~	36 (3.9)	508 (4.3)	64 (3.9)	494 (3.7)	9.2 (0.12)
Ukraine	0 (0.0)	~ ~	33 (4.1)	505 (6.8)	67 (4.1)	467 (4.7)	9.3 (0.11)
International Avg.	5 (0.3)	506 (3.4)	48 (0.6)	478 (0.9)	47 (0.5)	452 (0.9)	

Centerpoint of scale set at 10.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

TIMSS & PIRLS International Study Center
Lynch School of Education, Boston College

Exhibit 6.4: School Emphasis on Academic Success - Teacher Reports (Continued)

TIMSS 2011 Mathematics 8th Grade

Country		Very High Emphasis		High Emphasis		Medium Emphasis		Average Scale Score
		Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Ninth Grade Participants								
Honduras		5 (2.2)	349 (23.7)	42 (5.2)	338 (8.1)	53 (4.9)	336 (5.6)	9.7 (0.19)
South Africa		2 (0.6)	~ ~	39 (3.6)	368 (5.9)	59 (3.6)	339 (3.7)	9.4 (0.14)
Botswana		0 (0.0)	~ ~	32 (3.6)	415 (5.9)	67 (3.6)	387 (2.6)	9.0 (0.14)
Benchmarking Participants								
Alberta, Canada		18 (3.1)	517 (6.4)	64 (3.6)	503 (3.4)	17 (3.2)	498 (5.4)	11.4 (0.15)
Massachusetts, US		17 (3.6)	593 (12.3)	58 (5.7)	557 (8.3)	25 (4.7)	546 (17.0)	11.3 (0.20)
Abu Dhabi, UAE		15 (3.7)	499 (16.3)	54 (4.5)	444 (4.4)	30 (4.2)	434 (7.0)	11.0 (0.20)
California, US	r	13 (5.0)	534 (21.0)	55 (5.8)	504 (9.5)	32 (4.2)	462 (9.4)	10.5 (0.25)
Colorado, US	r	11 (4.4)	555 (16.1)	57 (6.8)	534 (6.9)	31 (6.0)	475 (12.2)	10.9 (0.26)
North Carolina, US	r	11 (4.1)	561 (36.0)	65 (6.3)	549 (8.7)	24 (5.6)	511 (8.9)	11.0 (0.23)
Dubai, UAE		11 (1.8)	533 (11.5)	66 (3.3)	479 (3.8)	23 (2.8)	436 (6.4)	11.2 (0.12)
Minnesota, US		10 (2.3)	584 (26.1)	59 (4.4)	544 (7.1)	32 (4.8)	537 (10.0)	10.8 (0.21)
Connecticut, US		9 (3.6)	539 (13.9)	68 (5.7)	528 (8.5)	22 (4.9)	490 (13.3)	10.9 (0.21)
Ontario, Canada		7 (2.0)	530 (9.7)	62 (3.9)	516 (3.5)	32 (3.9)	502 (3.8)	10.7 (0.16)
Alabama, US	r	5 (2.9)	565 (18.2)	56 (7.8)	468 (9.4)	39 (7.5)	454 (7.4)	10.3 (0.32)
Indiana, US	r	4 (2.1)	561 (18.5)	74 (5.4)	519 (6.0)	22 (5.0)	508 (11.7)	10.6 (0.18)
Quebec, Canada		4 (1.7)	568 (20.4)	46 (4.2)	542 (4.1)	50 (4.1)	520 (3.2)	9.6 (0.17)
Florida, US	r	2 (1.8)	~ ~	48 (7.3)	536 (10.9)	50 (7.6)	504 (11.1)	9.9 (0.33)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

How would you characterize each of the following within your school?

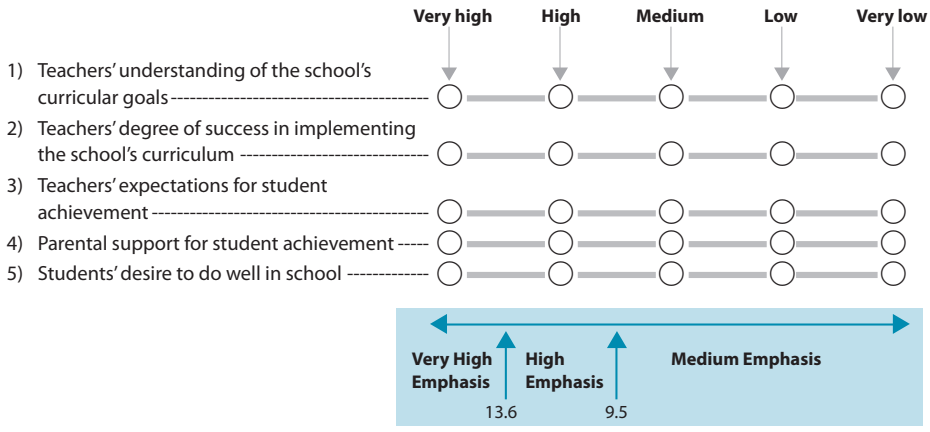


Exhibit 6.5: Principals Spend Time on Leadership Activities

TIMSS 2011 4th Grade Mathematics

Reported by Principals

Country	Percent of Students Whose Principals Spend "A Lot of Time"								
	Promoting the School's Educational Vision or Goals	Developing the School's Curricular and Educational Goals	Monitoring Teachers' Implementation of the School's Educational Goals in Their Teaching	Monitoring Students' Learning Progress to Ensure that the School's Educational Goals Are Reached	Keeping an Orderly Atmosphere in the School	Addressing Disruptive Student Behavior	Advising Teachers Who Have Questions or Problems with Their Teaching	Initiating Educational Projects or Improvements	Participating in Professional Development Activities Specifically for School Principals
Armenia	80 (3.4)	75 (4.0)	60 (4.3)	62 (3.8)	66 (4.3)	32 (4.2)	23 (3.7)	23 (3.4)	31 (4.0)
Australia	60 (4.1)	73 (3.8)	52 (4.6)	68 (3.8)	63 (3.6)	35 (3.8)	27 (3.4)	53 (4.4)	33 (3.7)
Austria	41 (3.9)	13 (3.0)	24 (3.4)	27 (3.2)	73 (4.3)	41 (4.6)	39 (4.5)	22 (3.6)	44 (3.9)
Azerbaijan	50 (4.4)	55 (4.3)	33 (4.0)	40 (4.8)	79 (3.7)	38 (4.4)	29 (3.3)	27 (3.9)	38 (4.0)
Bahrain	70 (4.6)	77 (4.2)	85 (2.9)	85 (3.1)	87 (3.0)	52 (4.8)	72 (4.4)	71 (4.6)	46 (5.8)
Belgium (Flemish)	35 (3.8)	30 (3.7)	24 (3.8)	22 (3.2)	36 (4.4)	31 (3.7)	28 (4.0)	29 (4.4)	34 (4.3)
Chile	59 (4.0)	75 (3.8)	55 (4.3)	63 (4.5)	74 (3.7)	62 (3.4)	39 (4.5)	45 (4.1)	37 (3.9)
Chinese Taipei	72 (3.6)	69 (3.8)	59 (3.9)	54 (3.6)	49 (4.4)	15 (3.0)	44 (4.2)	53 (4.2)	57 (4.4)
Croatia	64 (3.9)	69 (3.9)	39 (4.2)	41 (3.8)	84 (2.9)	50 (4.0)	43 (4.3)	32 (4.0)	70 (3.7)
Czech Republic	69 (3.9)	64 (4.0)	54 (4.3)	66 (3.8)	95 (1.7)	58 (4.2)	40 (4.5)	61 (3.7)	42 (4.1)
Denmark	r 28 (3.9)	r 24 (3.6)	r 6 (2.0)	r 9 (1.9)	r 62 (4.0)	r 26 (2.9)	r 24 (3.5)	r 24 (3.3)	r 17 (2.9)
England	61 (4.0)	62 (5.0)	56 (4.4)	76 (4.5)	53 (4.8)	25 (4.0)	17 (3.3)	37 (4.6)	17 (3.7)
Finland	36 (3.8)	34 (4.4)	18 (3.0)	12 (2.1)	33 (4.6)	26 (4.1)	16 (2.9)	28 (4.1)	23 (3.6)
Georgia	42 (4.8)	36 (4.5)	39 (4.0)	55 (3.7)	72 (3.9)	51 (4.2)	19 (3.5)	20 (3.3)	27 (3.5)
Germany	49 (3.4)	47 (3.3)	15 (2.6)	18 (2.6)	56 (3.6)	49 (3.5)	28 (3.2)	24 (3.2)	17 (2.6)
Hong Kong SAR	52 (4.5)	68 (4.3)	58 (4.4)	62 (4.0)	60 (4.1)	11 (2.6)	16 (3.4)	42 (4.8)	31 (4.3)
Hungary	80 (3.6)	72 (4.0)	59 (4.0)	62 (4.2)	79 (3.2)	59 (4.0)	34 (4.0)	41 (4.4)	35 (4.2)
Iran, Islamic Rep. of	77 (3.1)	88 (2.7)	79 (3.9)	86 (2.5)	89 (2.0)	82 (2.7)	61 (3.6)	44 (3.9)	67 (3.3)
Ireland	40 (4.5)	60 (4.5)	19 (3.2)	34 (4.4)	64 (3.9)	29 (4.0)	10 (2.4)	31 (3.8)	16 (2.8)
Italy	83 (3.6)	62 (3.8)	43 (3.9)	47 (4.2)	49 (3.7)	31 (3.3)	48 (3.7)	61 (3.7)	35 (3.3)
Japan	40 (4.0)	28 (3.8)	47 (4.1)	31 (4.2)	41 (4.0)	15 (3.0)	27 (3.6)	26 (3.9)	17 (3.1)
Kazakhstan	73 (3.0)	77 (3.5)	74 (3.9)	66 (3.9)	69 (3.5)	44 (3.9)	47 (3.6)	58 (4.4)	54 (4.4)
Korea, Rep. of	88 (2.5)	82 (3.5)	81 (3.7)	75 (4.0)	88 (2.9)	77 (3.6)	72 (3.8)	75 (4.0)	80 (2.9)
Kuwait	68 (4.0)	58 (4.1)	82 (3.2)	85 (3.0)	84 (3.2)	73 (3.5)	73 (3.7)	72 (3.6)	67 (4.2)
Lithuania	74 (3.7)	90 (2.4)	60 (3.6)	68 (4.0)	62 (4.5)	42 (3.8)	48 (4.3)	41 (4.3)	44 (3.9)
Malta	58 (0.1)	67 (0.1)	32 (0.1)	40 (0.1)	71 (0.1)	39 (0.1)	39 (0.1)	44 (0.1)	26 (0.1)
Morocco	64 (3.4)	58 (3.6)	63 (3.9)	59 (4.0)	91 (2.1)	66 (3.0)	56 (3.7)	43 (3.8)	42 (3.9)
Netherlands	r 33 (5.2)	r 49 (5.5)	r 48 (4.6)	r 44 (5.9)	r 14 (4.1)	r 15 (4.4)	r 31 (5.5)	r 43 (5.1)	r 23 (5.1)
New Zealand	65 (3.5)	70 (4.0)	45 (3.8)	71 (3.5)	47 (3.6)	21 (3.1)	24 (3.5)	41 (3.6)	18 (3.0)
Northern Ireland	47 (4.5)	73 (3.9)	r 35 (4.6)	61 (4.2)	54 (5.2)	13 (2.9)	r 7 (2.1)	r 35 (4.5)	r 23 (4.5)
Norway	27 (4.4)	19 (3.7)	17 (3.3)	17 (3.2)	56 (4.6)	31 (4.4)	16 (3.5)	23 (4.1)	24 (4.3)
Oman	40 (3.2)	r 18 (2.4)	75 (3.4)	80 (3.1)	82 (2.5)	45 (3.5)	51 (3.5)	36 (3.4)	24 (2.5)
Poland	56 (3.9)	49 (4.2)	59 (4.0)	75 (3.3)	76 (3.8)	40 (3.9)	29 (3.9)	51 (4.1)	54 (4.2)
Portugal	63 (4.4)	50 (5.4)	35 (4.7)	41 (4.9)	49 (4.9)	38 (5.3)	8 (2.6)	28 (5.4)	6 (1.8)
Qatar	70 (2.5)	81 (2.3)	81 (2.4)	81 (2.5)	85 (2.5)	64 (2.7)	69 (2.9)	61 (3.4)	54 (3.2)
Romania	84 (3.3)	84 (3.2)	81 (3.5)	84 (3.0)	87 (2.5)	73 (3.6)	57 (4.3)	63 (3.8)	69 (4.2)
Russian Federation	80 (2.8)	81 (2.6)	81 (2.6)	74 (2.9)	87 (2.1)	64 (3.1)	34 (3.1)	52 (3.6)	64 (4.0)
Saudi Arabia	48 (4.4)	61 (4.1)	77 (3.3)	76 (3.5)	78 (3.5)	57 (3.7)	52 (3.9)	45 (4.4)	40 (4.3)
Serbia	63 (3.3)	72 (3.9)	47 (4.8)	42 (4.6)	64 (3.7)	48 (4.0)	41 (4.1)	47 (4.2)	31 (3.7)
Singapore	76 (0.0)	80 (0.0)	66 (0.0)	77 (0.0)	66 (0.0)	32 (0.0)	33 (0.0)	58 (0.0)	47 (0.0)
Slovak Republic	56 (3.6)	69 (3.6)	45 (3.9)	42 (3.9)	60 (3.7)	55 (3.3)	34 (3.6)	46 (3.7)	46 (3.8)
Slovenia	68 (3.1)	62 (4.1)	61 (3.5)	69 (4.0)	92 (2.2)	59 (3.8)	53 (4.0)	62 (3.9)	73 (3.4)
Spain	58 (4.1)	62 (3.8)	40 (4.4)	47 (4.4)	68 (3.8)	39 (4.2)	19 (3.7)	47 (4.1)	33 (3.6)
Sweden	52 (4.4)	40 (4.8)	17 (3.2)	28 (4.2)	24 (3.7)	19 (3.6)	27 (4.0)	28 (4.1)	16 (3.6)
Thailand	68 (3.9)	74 (3.9)	76 (3.3)	77 (3.6)	94 (2.0)	51 (3.9)	74 (3.4)	68 (4.4)	69 (3.9)
Tunisia	49 (4.4)	52 (4.6)	54 (4.4)	61 (4.9)	86 (2.9)	61 (3.8)	49 (4.0)	26 (3.6)	18 (2.8)
Turkey	63 (3.2)	56 (3.7)	62 (3.6)	54 (3.6)	86 (2.4)	79 (2.8)	55 (3.7)	45 (3.4)	46 (3.2)
United Arab Emirates	69 (2.1)	77 (2.2)	82 (1.8)	85 (1.4)	82 (1.8)	55 (2.1)	62 (2.0)	65 (2.0)	47 (1.9)
United States	72 (2.8)	68 (2.3)	71 (2.4)	76 (2.1)	69 (3.0)	42 (2.8)	42 (2.6)	46 (2.9)	34 (2.7)
Yemen	48 (4.6)	47 (4.2)	71 (4.3)	64 (4.3)	84 (3.2)	64 (4.7)	52 (4.7)	18 (3.5)	28 (4.0)
International Avg.	59 (0.5)	60 (0.5)	53 (0.5)	57 (0.5)	68 (0.5)	44 (0.5)	39 (0.5)	43 (0.6)	39 (0.5)

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 6.5: Principals Spend Time on Leadership Activities (Continued)

Country	Percent of Students Whose Principals Spend "A Lot of Time"								
	Promoting the School's Educational Vision or Goals	Developing the School's Curricular and Educational Goals	Monitoring Teachers' Implementation of the School's Educational Goals in Their Teaching	Monitoring Students' Learning Progress to Ensure that the School's Educational Goals Are Reached	Keeping an Orderly Atmosphere in the School	Addressing Disruptive Student Behavior	Advising Teachers Who Have Questions or Problems with Their Teaching	Initiating Educational Projects or Improvements	Participating in Professional Development Activities Specifically for School Principals
Sixth Grade Participants									
Botswana	68 (3.7)	67 (3.9)	83 (2.8)	82 (3.0)	87 (2.5)	62 (4.6)	57 (3.6)	45 (4.2)	52 (4.7)
Honduras	58 (4.5)	63 (4.7)	51 (5.1)	65 (4.4)	90 (2.5)	72 (4.8)	56 (4.6)	63 (4.7)	51 (4.9)
Yemen	49 (4.6)	53 (4.3)	75 (3.9)	66 (4.2)	84 (2.9)	64 (4.6)	56 (4.3)	19 (3.8)	32 (4.3)
Benchmarking Participants									
Alberta, Canada	63 (4.3)	60 (4.7)	44 (4.6)	45 (4.8)	67 (4.1)	30 (4.4)	23 (4.1)	38 (4.4)	30 (4.0)
Ontario, Canada	65 (4.2)	76 (4.0)	53 (4.4)	61 (4.4)	75 (3.8)	52 (4.6)	32 (4.2)	43 (4.3)	44 (4.0)
Quebec, Canada	44 (4.7)	41 (4.3)	18 (3.4)	36 (3.8)	47 (4.3)	47 (4.7)	29 (4.0)	31 (4.0)	19 (3.2)
Abu Dhabi, UAE	78 (3.9)	79 (3.6)	83 (3.3)	87 (2.7)	82 (3.0)	51 (4.4)	66 (4.1)	64 (4.4)	59 (3.7)
Dubai, UAE	72 (0.4)	82 (0.4)	79 (0.4)	80 (0.4)	80 (0.2)	58 (0.5)	55 (0.5)	71 (0.4)	43 (0.3)
Florida, US	r 82 (4.1)	r 79 (5.5)	r 79 (5.0)	r 88 (2.8)	r 77 (6.1)	r 39 (6.5)	r 36 (6.0)	r 38 (5.9)	r 43 (6.3)
North Carolina, US	81 (5.9)	76 (6.8)	88 (4.7)	84 (5.9)	72 (7.2)	29 (7.5)	33 (6.7)	30 (7.9)	41 (7.8)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 6.6: Principals Spend Time on Leadership Activities

Reported by Principals

Country	Percent of Students Whose Principals Spend "A Lot of Time"								
	Promoting the School's Educational Vision or Goals	Developing the School's Curricular and Educational Goals	Monitoring Teachers' Implementation of the School's Educational Goals in Their Teaching	Monitoring Students' Learning Progress to Ensure that the School's Educational Goals Are Reached	Keeping an Orderly Atmosphere in the School	Addressing Disruptive Student Behavior	Advising Teachers Who Have Questions or Problems with Their Teaching	Initiating Educational Projects or Improvements	Participating in Professional Development Activities Specifically for School Principals
Armenia	79 (3.5)	75 (3.4)	66 (3.8)	59 (3.9)	69 (4.4)	31 (4.3)	26 (3.6)	23 (3.3)	32 (4.0)
Australia	64 (3.3)	63 (4.1)	34 (3.5)	53 (3.9)	55 (3.5)	35 (3.8)	19 (3.0)	52 (4.1)	30 (3.9)
Bahrain	60 (0.3)	71 (0.3)	78 (0.3)	81 (0.3)	88 (0.2)	70 (0.3)	67 (0.3)	61 (0.3)	46 (0.3)
Chile	65 (4.1)	78 (3.2)	54 (4.4)	58 (4.8)	78 (3.0)	66 (3.7)	37 (4.1)	46 (4.2)	38 (4.2)
Chinese Taipei	62 (3.8)	54 (3.8)	47 (4.0)	54 (4.0)	75 (3.5)	22 (3.6)	25 (3.7)	29 (3.6)	31 (4.2)
England	64 (4.6)	67 (4.4)	55 (4.5)	75 (3.8)	51 (4.6)	29 (4.0)	20 (3.1)	33 (4.7)	9 (2.7)
Finland	34 (4.4)	25 (3.9)	22 (3.8)	28 (4.0)	44 (4.3)	37 (4.1)	17 (3.1)	21 (3.9)	16 (3.2)
Georgia	76 (3.7)	71 (4.3)	72 (3.1)	75 (3.4)	84 (2.9)	68 (4.2)	50 (4.2)	38 (3.9)	52 (3.7)
Ghana	67 (3.9)	48 (4.5)	86 (3.0)	88 (2.8)	89 (2.8)	57 (3.8)	50 (4.4)	25 (3.7)	36 (4.1)
Hong Kong SAR	41 (4.9)	47 (5.1)	48 (4.9)	41 (5.3)	54 (4.9)	11 (2.9)	21 (3.9)	21 (4.4)	24 (4.2)
Hungary	78 (3.7)	71 (3.7)	57 (4.4)	63 (4.0)	78 (3.6)	58 (4.4)	40 (4.1)	39 (4.0)	44 (4.1)
Indonesia	85 (2.8)	85 (3.8)	80 (3.8)	85 (3.4)	95 (2.3)	87 (2.8)	76 (3.5)	38 (4.8)	75 (3.8)
Iran, Islamic Rep. of	84 (2.2)	91 (1.9)	81 (3.0)	92 (2.0)	93 (1.6)	80 (2.9)	48 (3.5)	48 (3.8)	61 (3.7)
Israel	80 (3.4)	71 (3.7)	62 (4.0)	75 (3.6)	85 (3.1)	76 (3.5)	64 (4.1)	67 (4.0)	64 (4.2)
Italy	79 (2.9)	61 (4.0)	40 (4.0)	56 (4.2)	64 (4.0)	49 (4.2)	39 (3.5)	61 (3.7)	29 (3.3)
Japan	31 (3.9)	21 (3.7)	32 (4.0)	19 (3.0)	48 (3.9)	21 (3.2)	18 (3.4)	21 (3.7)	11 (2.7)
Jordan	62 (3.9)	67 (3.8)	88 (2.7)	82 (3.3)	95 (2.0)	84 (2.8)	72 (3.6)	42 (3.6)	41 (3.9)
Kazakhstan	72 (3.8)	79 (3.0)	66 (4.1)	71 (3.7)	64 (4.2)	41 (4.0)	46 (4.1)	58 (4.0)	47 (4.3)
Korea, Rep. of	88 (3.1)	78 (3.7)	77 (3.2)	73 (3.5)	89 (2.5)	70 (3.1)	61 (3.7)	64 (3.7)	75 (3.1)
Lebanon	75 (3.7)	67 (3.8)	76 (4.1)	84 (3.0)	85 (3.2)	73 (3.9)	76 (3.7)	42 (3.9)	45 (4.2)
Lithuania	74 (3.8)	82 (3.4)	42 (4.2)	61 (4.3)	71 (3.9)	41 (4.1)	38 (4.2)	47 (4.5)	42 (4.2)
Macedonia, Rep. of	50 (4.0)	57 (3.7)	46 (3.9)	53 (4.2)	59 (3.7)	42 (3.9)	37 (3.7)	45 (3.7)	43 (3.7)
Malaysia	71 (3.7)	76 (2.9)	74 (3.5)	79 (2.7)	87 (2.4)	75 (3.4)	55 (4.1)	36 (3.5)	42 (3.8)
Morocco	61 (3.3)	48 (2.6)	58 (3.0)	59 (3.7)	92 (1.8)	75 (3.3)	51 (3.0)	55 (3.6)	39 (3.2)
New Zealand	57 (5.1)	59 (5.2)	30 (4.4)	42 (5.6)	54 (5.1)	31 (5.3)	16 (3.3)	37 (3.7)	20 (4.5)
Norway	29 (3.8)	20 (3.6)	20 (3.1)	22 (3.2)	54 (3.7)	45 (4.7)	20 (3.6)	15 (3.1)	16 (3.6)
Oman	52 (3.4)	21 (2.3)	79 (2.5)	77 (2.5)	86 (2.2)	47 (3.3)	56 (3.3)	28 (2.9)	28 (3.4)
Palestinian Nat'l Auth.	60 (4.1)	58 (3.8)	90 (1.5)	92 (2.0)	89 (2.5)	75 (3.3)	58 (3.9)	32 (3.8)	37 (3.8)
Qatar	72 (0.8)	78 (0.5)	79 (1.0)	83 (1.1)	82 (1.1)	69 (1.0)	66 (1.0)	57 (0.9)	54 (0.9)
Romania	87 (2.8)	86 (3.2)	85 (2.9)	84 (3.6)	92 (2.6)	69 (4.1)	55 (4.4)	65 (4.0)	71 (4.2)
Russian Federation	80 (2.7)	82 (2.6)	68 (3.4)	69 (2.8)	78 (2.7)	51 (3.6)	27 (2.8)	54 (3.7)	61 (3.5)
Saudi Arabia	53 (4.3)	59 (3.8)	81 (3.2)	72 (3.2)	88 (2.7)	70 (3.5)	56 (4.5)	37 (3.6)	34 (3.7)
Singapore	68 (0.0)	66 (0.0)	63 (0.0)	72 (0.0)	56 (0.0)	27 (0.0)	21 (0.0)	42 (0.0)	26 (0.0)
Slovenia	58 (3.6)	56 (4.2)	60 (3.9)	62 (3.6)	83 (3.1)	50 (3.9)	48 (4.5)	48 (3.9)	72 (3.5)
Sweden	r 45 (4.8)	r 44 (4.7)	r 20 (3.8)	r 35 (4.3)	r 45 (4.7)	r 29 (3.9)	r 21 (3.6)	r 22 (4.1)	r 24 (3.7)
Syrian Arab Republic	49 (4.3)	49 (4.5)	75 (3.7)	75 (3.6)	86 (3.0)	74 (3.6)	57 (4.5)	23 (3.4)	22 (3.5)
Thailand	72 (3.9)	78 (3.7)	69 (4.1)	68 (4.0)	85 (2.7)	51 (4.0)	61 (4.3)	57 (4.1)	76 (3.4)
Tunisia	39 (3.9)	39 (3.7)	51 (3.8)	59 (3.5)	89 (2.4)	75 (2.9)	44 (4.0)	21 (3.0)	14 (2.6)
Turkey	69 (2.7)	63 (2.9)	65 (3.2)	60 (3.6)	85 (2.4)	81 (2.7)	52 (3.5)	42 (3.1)	48 (3.4)
Ukraine	59 (4.3)	60 (4.0)	84 (3.6)	57 (4.4)	56 (4.1)	36 (4.0)	30 (3.9)	43 (4.2)	22 (3.4)
United Arab Emirates	67 (1.9)	76 (2.0)	83 (1.8)	81 (1.8)	80 (1.8)	56 (2.2)	57 (2.4)	59 (2.1)	48 (2.4)
United States	65 (2.6)	64 (2.2)	64 (2.2)	65 (2.3)	75 (2.2)	46 (2.5)	38 (2.2)	44 (2.5)	36 (2.6)
International Avg.	64 (0.6)	62 (0.5)	62 (0.5)	65 (0.5)	75 (0.5)	54 (0.5)	44 (0.6)	41 (0.6)	40 (0.5)

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 6.6: Principals Spend Time on Leadership Activities (Continued)

Country	Percent of Students Whose Principals Spend "A Lot of Time"								
	Promoting the School's Educational Vision or Goals	Developing the School's Curricular and Educational Goals	Monitoring Teachers' Implementation of the School's Educational Goals in Their Teaching	Monitoring Students' Learning Progress to Ensure that the School's Educational Goals Are Reached	Keeping an Orderly Atmosphere in the School	Addressing Disruptive Student Behavior	Advising Teachers Who Have Questions or Problems with Their Teaching	Initiating Educational Projects or Improvements	Participating in Professional Development Activities Specifically for School Principals
Ninth Grade Participants									
Botswana	64 (4.1)	48 (4.4)	56 (4.2)	70 (4.0)	86 (3.2)	71 (4.1)	28 (3.9)	26 (3.7)	33 (4.2)
Honduras	49 (5.2)	53 (4.8)	43 (4.4)	46 (4.6)	86 (3.0)	66 (4.0)	48 (4.5)	35 (4.4)	39 (4.5)
South Africa	60 (3.8)	62 (3.4)	61 (4.0)	69 (3.9)	90 (2.6)	77 (3.5)	51 (3.6)	31 (3.4)	57 (3.9)
Benchmarking Participants									
Alberta, Canada	50 (4.0)	54 (4.0)	33 (3.8)	45 (4.5)	65 (4.4)	40 (4.3)	25 (3.4)	37 (4.9)	27 (4.0)
Ontario, Canada	61 (4.4)	69 (4.0)	49 (4.1)	45 (4.5)	78 (3.6)	44 (4.4)	34 (4.0)	32 (4.0)	38 (3.5)
Quebec, Canada	33 (3.9)	40 (4.0)	22 (2.8)	41 (3.9)	59 (4.3)	66 (4.5)	32 (4.0)	27 (3.5)	12 (2.9)
Abu Dhabi, UAE	70 (3.6)	74 (3.8)	79 (3.5)	78 (4.0)	84 (3.1)	55 (4.3)	62 (4.6)	65 (4.7)	59 (4.0)
Dubai, UAE	68 (0.4)	78 (0.4)	86 (0.2)	80 (0.4)	68 (0.4)	43 (0.5)	40 (0.4)	55 (0.5)	35 (0.5)
Alabama, US	r 53 (9.3)	r 50 (9.1)	r 65 (8.4)	r 73 (6.5)	r 78 (6.2)	r 57 (8.5)	r 25 (6.1)	r 24 (7.6)	r 29 (6.5)
California, US	r 71 (6.0)	r 71 (6.5)	r 76 (6.6)	r 73 (6.7)	r 78 (6.1)	r 52 (7.4)	r 43 (7.5)	r 49 (7.1)	r 45 (6.7)
Colorado, US	72 (7.2)	71 (5.1)	65 (7.1)	59 (6.3)	52 (7.2)	29 (7.7)	41 (6.9)	46 (6.8)	32 (6.9)
Connecticut, US	r 66 (7.7)	65 (6.2)	76 (6.2)	82 (4.8)	77 (5.2)	52 (6.6)	41 (6.6)	47 (8.2)	21 (5.7)
Florida, US	68 (7.0)	67 (7.5)	77 (6.5)	84 (5.6)	85 (5.4)	39 (7.3)	38 (7.6)	52 (7.9)	62 (8.0)
Indiana, US	r 60 (8.6)	r 59 (7.9)	r 61 (8.0)	r 64 (6.9)	r 71 (7.0)	r 33 (7.7)	r 28 (7.1)	r 45 (7.8)	r 22 (5.8)
Massachusetts, US	63 (6.6)	70 (6.5)	68 (7.6)	r 57 (6.5)	52 (7.3)	23 (6.2)	37 (7.5)	40 (7.6)	22 (5.7)
Minnesota, US	66 (7.7)	61 (7.1)	53 (7.8)	57 (7.3)	76 (7.0)	46 (6.0)	25 (6.2)	48 (7.7)	25 (6.1)
North Carolina, US	63 (7.3)	54 (7.9)	60 (7.0)	60 (6.8)	82 (5.6)	46 (7.0)	38 (5.6)	30 (7.0)	39 (6.7)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Principals Spend Time on Leadership Activities

The effectiveness of school leadership has become a central issue, as principals worldwide are held increasingly accountable for their students' achievement outcomes. However, the effects of principal leadership are often indirect and difficult to measure. A meta-analysis of multinational studies conducted between 1986 and 1996 found that "defining and communicating the school's mission" had the largest direct effect on student achievement (Witziers, Bosker, & Kruger, 2003), whereas a different meta-analysis of 27 studies conducted between 1978 and 2006 found strong effects for promoting teacher learning and development, and establishing goals (Robinson, Lloyd, & Rowe, 2008).

TIMSS 2011 used research conducted in the Netherlands (ten Bruggencate, Luyten, Scheerens, & Sleegers, 2012) to develop questions about principals' leadership styles. These questions were included in both the fourth and eighth grade assessments. Exhibit 6.5 presents principals' reports for the fourth grade about the various activities upon which they spend "a lot of time." The pattern of varying reports from country to country held for the fourth grade, the sixth grade, and the benchmarking participants.

The results for the fourth grade were averaged across countries to provide some summary data. The first two questions related to defining and communicating the school's mission, and on average, more than half of the fourth grade students (59% and 60%), were in schools where this occupied "a lot" of the principal's time. The next two questions addressed monitoring whether goals are achieved by teachers and students, with just over half the students (53% and 57%) in schools where principals reported spending "a lot of time" on these activities. The next two categories asked about maintaining discipline: two-thirds of students were in schools where the principal spent "a lot of time" keeping an orderly atmosphere, and 44 percent had principals that needed to spend "a lot of time" addressing disruptive student behavior. The last three areas appear to occupy less time: advising teachers, initiating projects, and participating in professional development activities.

Exhibit 6.6 summarizes principals' reports from the eighth grade assessment about time spent on leadership activities. About two-thirds of the eighth grade students were in schools where the principal reported spending "a lot of time" on defining and communicating the school's mission and in monitoring whether goals were being achieved by teachers and students. Three-fourths of the eighth grade students were in schools where the principal devoted "a lot of time" to keeping an orderly atmosphere, and more than half

had principals that needed to spend "a lot of time" addressing disruptive student behavior. Similar to the fourth grade, the last three areas—advising teachers, initiating projects, and participating in professional development activities—appear to occupy less of the principal's time.

Schools with Discipline and Safety Problems

The sense of security that comes from attending a school with few behavior problems and having little or no concern about student or teacher safety promotes a stable learning environment. There is increasing research showing that a safe school environment is important for students' academic achievement. On the other hand, a general lack of discipline, especially if students and teachers are afraid for their safety, does not facilitate learning. Unfortunately, community and school violence are becoming an increasing problem, especially among urban youth.

Safe and Orderly School

There is growing evidence that students' perceived school safety adversely affects academic performance, even for primary school children (Milam, Furr-Holden, & Leaf, 2010). It seems that safety at school can no longer be taken for granted, even at the fourth grade. To provide information on the extent to which school safety might be affecting mathematics achievement, TIMSS 2011 developed the Safe and Orderly School scale. Teachers in both the fourth and eighth grade assessments were asked the degree to which they agreed or disagreed with five statements:

- This school is located in a safe neighborhood;
- I feel safe at this school;
- This school's security policies and practices are sufficient;
- The students behave in an orderly manner; and
- The students are respectful of the teachers.

Exhibit 6.7 presents the results for the Safe and Orderly School scale for the fourth grade assessment. Students were scored according to their teachers' degree of agreement with the five statements. Students in **Safe and Orderly** schools had teachers that "agreed a lot" with three of the five qualities and "agreed a little" with the other two, on average. There was substantial variation across countries, but internationally, on average, across the fourth grade countries, the majority of students (53%) were attending schools judged by

their teachers to be **Safe and Orderly**. Almost all of the remaining students (43%) were in schools judged to be **Somewhat Safe and Orderly**. In general, only small percentages of students (4% on average) were in schools judged **Not Safe and Orderly** at best, their teachers "disagreed a little" with three of the five statements and "agreed a little" with the other two, on average. Across the fourth grade countries, on average, the safer the school as reported by their teachers, the higher the students' average mathematics achievement.

Exhibit 6.8 presents the corresponding Safe and Orderly School scale results for the eighth grade assessment. Students were assigned to one of the three school orderliness categories using the same criteria as at the fourth grade, and with broadly similar results. Although almost all of the eighth grade students, on average internationally, were in **Safe and Orderly** or **Somewhat Safe and Orderly** schools, the eighth grade mathematics teachers were noticeably less positive in their reports. On average, across the eighth-grade countries, 45 percent of students (compared to 53% at the fourth grade) were attending schools judged by their teachers to be safe and orderly, 49 percent of students (compared to 43%) were in schools judged to be **Somewhat Safe and Orderly**, and 6 percent of students (compared to 4%) were in schools judged **Not Safe and Orderly**. The average mathematics achievement gap between students in the **Safe and Orderly** and **Not Safe and Orderly** schools also was greater at the eighth grade (34 points vs. 28 points).

School Discipline and Safety

Previous TIMSS assessments have asked principals for their perceptions about the degree to which a series of discipline, disorderly, and bullying behaviors are problems in their schools, and found that having fewer problems was related to higher average achievement. Exhibit 6.9 presents the TIMSS 2011 results for the fourth grade School Discipline and Safety scale based on asking principals about the extent of ten different discipline and school safety problems (see the second page of the exhibit for the complete list of problems). Countries are ordered by the percentage of students whose principals reported few student discipline and school safety problems. Principals in schools with **Hardly Any Problems** with discipline or safety reported "not a problem" for five of the ten discipline and safety issues and only "minor problem" for the other five, on average. Principals in schools with **Moderate Problems** reported "moderate problem" for five of the ten issues and "minor problem" for the other five, on average.

More than half of the students (61%), on average, across the fourth grade countries were in the **Hardly Any Problems** category and 29 percent were in the **Minor Problems** category. Only 11 percent, on average, attended schools where principals reported **Moderate Problems** with discipline and school safety. Students whose principals reported **Moderate Problems** in their schools had substantially lower mathematics achievement, by 45 points on average, than students whose principals reported **Hardly Any Problems** (451 vs. 496).The results for the sixth grade and benchmarking participants followed a similar pattern.

Exhibit 6.10 presents the results for the School Discipline and Safety scale for the TIMSS 2011 eighth grade assessment. This scale is based on eleven discipline and school safety problems, ten of which comprised the fourth grade scale plus one additional problem more suited to older students—"Physical injury to teachers or staff" (see the second page of the exhibit for the complete list of problems). Compared to the situation at the fourth grade, relatively speaking, there were fewer eighth grade students in the **Hardly Any Problems** category (38% vs. 61%) and more in the **Minor Problems** category (49% vs. 29%). There were similar percentages of students in schools with **Moderate Problems** at the fourth and eighth grades (11% and 13%). Looking more closely at the problems comprising the scales, the increase from fourth to eighth grade in the percentage of students in schools with discipline and safety problems is largely because eight of these problems (classroom disturbance, cheating, profanity, vandalism, theft, intimidation or verbal abuse among students, students fighting, and intimidation or verbal abuse of teachers) often were "not a problem" for fourth grade principals but more often were a "minor problem" for principals of eighth grade schools.

Exhibit 6.7: Safe and Orderly School

TIMSS 2011 Mathematics 4th Grade

Reported by Teachers

Students were scored according to their teachers' degree of agreement with five statements on the *Safe and Orderly School* scale. Students in **Safe and Orderly** schools had a score on the scale of at least 10.2, which corresponds to their teachers "agreeing a lot" with three of the five qualities of a safe and orderly school and "agreeing a little" with the other two, on average. Students in **Not Safe and Orderly** schools had a score no higher than 6.3, which corresponds to their teachers "disagreeing a little" with three of the five qualities and "agreeing a little" with the other two, on average. All other students attended **Somewhat Safe and Orderly** schools.

Country	Safe and Orderly		Somewhat Safe and Orderly		Not Safe and Orderly		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Northern Ireland r	85 (2.7)	568 (4.0)	15 (2.6)	537 (8.6)	0 (0.4)	~ ~	11.5 (0.14)
Georgia	83 (2.5)	453 (3.9)	16 (2.4)	442 (10.4)	1 (0.7)	~ ~	11.3 (0.12)
Azerbaijan	83 (2.9)	465 (6.5)	16 (2.8)	459 (16.7)	1 (0.7)	~ ~	11.4 (0.13)
Ireland	78 (3.3)	537 (3.0)	20 (3.3)	497 (6.0)	2 (1.0)	~ ~	11.3 (0.15)
Australia r	76 (3.1)	529 (3.7)	20 (3.0)	491 (7.9)	4 (1.4)	460 (12.4)	11.1 (0.16)
United Arab Emirates	76 (2.2)	440 (3.0)	24 (2.2)	418 (5.7)	0 (0.2)	~ ~	10.8 (0.08)
Croatia	73 (3.1)	489 (2.2)	26 (3.0)	495 (4.2)	1 (0.7)	~ ~	10.8 (0.12)
Thailand	72 (3.9)	462 (4.5)	26 (3.8)	462 (10.1)	3 (1.8)	352 (15.0)	11.0 (0.18)
Armenia	72 (2.7)	455 (4.2)	26 (2.6)	447 (6.6)	2 (1.1)	~ ~	10.9 (0.13)
Kuwait	70 (3.1)	346 (3.9)	30 (3.1)	331 (6.3)	0 (0.0)	~ ~	10.4 (0.10)
New Zealand	70 (2.3)	501 (2.9)	29 (2.3)	456 (4.8)	1 (0.5)	~ ~	11.0 (0.10)
Denmark	68 (3.5)	544 (2.7)	32 (3.5)	534 (4.6)	0 (0.0)	~ ~	10.6 (0.12)
Kazakhstan	67 (4.0)	505 (5.8)	33 (4.0)	495 (9.2)	1 (0.4)	~ ~	10.7 (0.15)
England	67 (4.3)	557 (3.8)	31 (4.1)	519 (7.9)	2 (1.3)	~ ~	10.7 (0.18)
United States	66 (2.4)	553 (2.3)	30 (2.3)	526 (3.4)	4 (0.8)	503 (8.4)	10.5 (0.09)
Qatar	65 (3.6)	421 (6.1)	34 (3.7)	393 (8.1)	1 (0.0)	~ ~	10.5 (0.11)
Norway	64 (4.6)	501 (3.5)	36 (4.6)	484 (4.6)	0 (0.0)	~ ~	10.7 (0.17)
Saudi Arabia	62 (4.4)	425 (7.2)	36 (4.4)	389 (7.2)	2 (0.9)	~ ~	10.4 (0.16)
Singapore	61 (2.5)	613 (3.8)	37 (2.5)	595 (5.6)	2 (0.7)	~ ~	10.3 (0.10)
Iran, Islamic Rep. of	60 (3.5)	440 (4.2)	39 (3.4)	419 (6.1)	1 (0.8)	~ ~	10.3 (0.15)
Bahrain	57 (4.2)	446 (4.0)	42 (4.3)	423 (4.9)	1 (0.0)	~ ~	10.3 (0.17)
Austria	57 (3.4)	513 (3.0)	40 (3.5)	504 (3.3)	2 (1.5)	~ ~	10.0 (0.13)
Netherlands r	56 (4.6)	541 (2.6)	43 (4.6)	536 (3.8)	1 (0.8)	~ ~	10.2 (0.18)
Poland	55 (3.4)	478 (2.8)	44 (3.4)	485 (3.3)	1 (0.6)	~ ~	10.0 (0.12)
Hong Kong SAR	55 (4.7)	603 (4.6)	44 (4.8)	602 (6.0)	1 (0.6)	~ ~	10.2 (0.17)
Hungary	52 (3.8)	525 (4.9)	46 (3.6)	506 (5.6)	3 (1.3)	452 (24.4)	9.7 (0.14)
Spain	51 (3.8)	497 (3.2)	45 (3.9)	470 (4.4)	5 (1.8)	449 (14.4)	9.7 (0.16)
Russian Federation	49 (4.0)	546 (5.0)	48 (3.8)	539 (5.4)	2 (1.3)	~ ~	9.9 (0.17)
Malta	49 (0.1)	503 (1.8)	46 (0.1)	488 (2.1)	5 (0.1)	500 (5.9)	9.9 (0.01)
Lithuania	47 (3.2)	538 (3.7)	51 (3.1)	530 (3.2)	2 (0.9)	~ ~	9.7 (0.12)
Germany	47 (3.8)	533 (3.0)	52 (3.7)	525 (3.1)	2 (0.9)	~ ~	9.8 (0.13)
Portugal	46 (5.1)	541 (6.9)	50 (4.9)	527 (4.6)	4 (1.3)	507 (12.7)	9.6 (0.20)
Belgium (Flemish)	46 (3.0)	555 (2.6)	52 (2.9)	545 (2.3)	1 (0.8)	~ ~	9.7 (0.11)
Oman	46 (2.6)	400 (3.7)	52 (2.7)	374 (4.1)	2 (0.9)	~ ~	9.8 (0.09)
Yemen	46 (4.4)	257 (8.4)	52 (4.5)	235 (7.9)	2 (0.9)	~ ~	9.9 (0.15)
Czech Republic	45 (3.8)	512 (3.7)	53 (3.6)	510 (3.5)	2 (0.9)	~ ~	9.6 (0.12)
Sweden r	41 (4.8)	516 (3.4)	54 (4.9)	501 (3.2)	5 (1.3)	453 (3.6)	9.6 (0.16)
Chile	41 (3.7)	484 (4.6)	46 (3.7)	451 (4.2)	13 (3.1)	430 (13.1)	9.2 (0.19)
Slovak Republic	40 (3.6)	509 (5.9)	58 (3.6)	506 (4.8)	1 (0.7)	~ ~	9.4 (0.09)
Serbia	40 (4.2)	515 (4.8)	55 (4.1)	520 (3.9)	5 (1.6)	478 (20.5)	9.4 (0.16)
Romania	40 (3.6)	480 (9.7)	55 (3.7)	483 (7.4)	5 (1.6)	459 (17.9)	9.5 (0.14)
Tunisia	40 (3.9)	367 (6.9)	51 (3.8)	355 (4.8)	10 (2.6)	347 (17.0)	9.3 (0.16)
Turkey	37 (3.3)	495 (4.8)	45 (3.1)	461 (6.8)	18 (2.7)	438 (15.9)	8.9 (0.17)
Finland	36 (3.5)	554 (3.5)	59 (4.0)	544 (2.7)	6 (1.7)	519 (8.8)	9.4 (0.12)
Chinese Taipei	31 (3.8)	590 (2.4)	62 (3.7)	594 (2.7)	7 (2.0)	575 (5.2)	9.0 (0.15)
Morocco	29 (3.7)	363 (8.8)	53 (4.4)	331 (7.0)	17 (3.0)	321 (11.7)	8.8 (0.18)
Slovenia	27 (3.1)	511 (3.6)	67 (3.2)	515 (2.8)	6 (1.6)	498 (9.0)	8.9 (0.11)
Korea, Rep. of	24 (3.7)	615 (5.0)	69 (3.8)	603 (2.2)	7 (2.2)	593 (4.5)	8.7 (0.18)
Italy	18 (2.6)	508 (5.6)	75 (2.8)	511 (3.4)	6 (2.0)	487 (12.1)	8.6 (0.12)
Japan	5 (1.7)	589 (5.7)	83 (3.1)	587 (1.9)	12 (2.6)	574 (5.6)	7.9 (0.09)
International Avg.	53 (0.5)	498 (0.7)	43 (0.5)	483 (0.8)	4 (0.2)	470 (2.9)	

Centerpoint of scale set at 10.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 6.7: Safe and Orderly School (Continued)

Country	Safe and Orderly		Somewhat Safe and Orderly		Not Safe and Orderly		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Sixth Grade Participants							
Honduras	62 (4.4)	392 (7.8)	33 (4.2)	404 (8.3)	5 (1.7)	393 (22.7)	10.5 (0.19)
Yemen	48 (3.6)	346 (8.5)	49 (3.6)	348 (7.7)	3 (1.4)	360 (25.0)	9.7 (0.13)
Botswana	22 (3.8)	455 (10.3)	56 (4.4)	412 (5.9)	22 (3.5)	405 (6.1)	8.2 (0.18)
Benchmarking Participants							
Dubai, UAE r	84 (1.9)	474 (3.1)	15 (1.9)	453 (10.1)	0 (0.3)	~ ~	11.4 (0.09)
Alberta, Canada r	80 (3.5)	510 (3.1)	19 (3.6)	497 (5.9)	1 (0.8)	~ ~	11.3 (0.16)
Abu Dhabi, UAE	78 (4.0)	422 (5.4)	21 (3.9)	404 (11.7)	0 (0.5)	~ ~	10.8 (0.14)
Florida, US r	65 (4.4)	553 (4.3)	28 (4.3)	527 (4.6)	7 (2.7)	523 (23.8)	10.4 (0.25)
Ontario, Canada	62 (3.9)	526 (3.0)	35 (3.9)	506 (5.6)	3 (0.9)	513 (14.1)	10.5 (0.16)
North Carolina, US	59 (6.5)	564 (4.6)	34 (5.7)	537 (7.8)	7 (3.5)	530 (21.3)	10.2 (0.28)
Quebec, Canada	45 (4.5)	533 (2.9)	50 (4.4)	533 (3.5)	5 (1.9)	519 (9.3)	9.8 (0.17)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Thinking about your current school, indicate the extent to which you agree or disagree with each of the following statements.

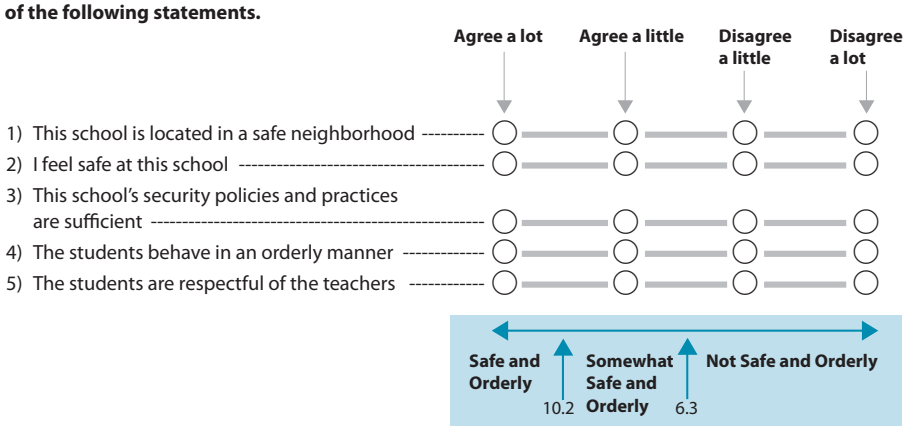


Exhibit 6.8 Safe and Orderly School

TIMSS 2011 8th Grade Mathematics

Reported by Teachers

Students were scored according to their teachers' degree of agreement with five statements on the *Safe and Orderly School* scale. Students in **Safe and Orderly** schools had a score on the scale of at least 10.7, which corresponds to their teachers "agreeing a lot" with three of the five qualities of a safe and orderly school and "agreeing a little" with the other two, on average. Students in **Not Safe and Orderly** schools had a score no higher than 6.8, which corresponds to their teachers "disagreeing a little" with three of the five qualities and "agreeing a little" with the other two, on average. All other students attended **Somewhat Safe and Orderly** schools.

Country	Safe and Orderly		Somewhat Safe and Orderly		Not Safe and Orderly		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Georgia	73 (3.2)	435 (4.6)	26 (3.1)	417 (7.8)	1 (0.6)	~ ~	11.2 (0.12)
Qatar	68 (3.2)	421 (5.9)	29 (3.0)	384 (9.8)	3 (1.1)	396 (25.6)	11.0 (0.11)
United Arab Emirates	68 (2.2)	465 (3.0)	31 (2.2)	435 (4.4)	1 (0.2)	~ ~	10.9 (0.07)
Ukraine	66 (3.9)	477 (5.0)	34 (3.9)	484 (7.1)	0 (0.0)	~ ~	10.7 (0.10)
Kazakhstan	65 (4.1)	489 (5.1)	34 (4.1)	483 (7.6)	1 (0.7)	~ ~	11.0 (0.14)
Israel	64 (2.9)	532 (5.5)	32 (2.9)	496 (8.6)	3 (1.4)	488 (31.6)	10.8 (0.13)
Armenia	63 (3.7)	471 (3.9)	35 (3.5)	457 (4.9)	2 (0.8)	~ ~	10.9 (0.14)
Norway	62 (4.4)	479 (3.2)	38 (4.4)	470 (3.8)	0 (0.0)	~ ~	10.9 (0.14)
Syrian Arab Republic	60 (4.3)	386 (5.5)	38 (4.4)	366 (7.6)	2 (1.3)	~ ~	10.6 (0.15)
Singapore	58 (2.4)	623 (5.1)	39 (2.4)	596 (5.8)	2 (0.7)	~ ~	10.7 (0.10)
Iran, Islamic Rep. of	55 (3.5)	424 (6.8)	42 (3.5)	406 (5.7)	3 (1.0)	377 (14.0)	10.6 (0.12)
Australia r	55 (4.2)	530 (8.3)	36 (3.9)	482 (7.0)	9 (2.3)	465 (17.0)	10.5 (0.20)
New Zealand	55 (3.3)	495 (6.9)	40 (3.5)	475 (10.2)	5 (1.8)	486 (16.8)	10.5 (0.15)
Thailand	54 (3.6)	436 (6.7)	41 (3.8)	415 (8.3)	4 (1.7)	432 (16.0)	10.4 (0.14)
United States r	54 (2.5)	526 (4.3)	38 (2.1)	494 (4.6)	8 (1.7)	500 (13.2)	10.4 (0.13)
Romania	54 (4.2)	463 (6.8)	45 (4.1)	455 (6.8)	1 (0.6)	~ ~	10.5 (0.15)
Hong Kong SAR	54 (4.7)	599 (6.8)	45 (4.7)	564 (8.2)	1 (0.0)	~ ~	10.5 (0.16)
Macedonia, Rep. of r	53 (3.7)	441 (8.0)	44 (3.9)	402 (8.7)	3 (1.4)	436 (33.5)	10.5 (0.16)
England	53 (4.5)	521 (7.2)	42 (4.2)	487 (10.3)	6 (1.9)	505 (19.1)	10.6 (0.19)
Saudi Arabia	51 (3.8)	405 (6.4)	46 (4.0)	386 (6.3)	2 (1.2)	~ ~	10.3 (0.14)
Bahrain	49 (3.1)	429 (4.4)	47 (3.3)	396 (4.3)	4 (1.2)	345 (4.8)	10.2 (0.11)
Hungary	48 (3.5)	515 (4.7)	47 (3.6)	501 (5.8)	5 (1.7)	439 (18.8)	9.9 (0.11)
Malaysia	44 (4.3)	459 (8.6)	53 (3.9)	425 (6.3)	3 (1.4)	429 (19.2)	10.2 (0.17)
Russian Federation	42 (3.6)	547 (5.1)	56 (3.6)	533 (4.6)	2 (0.9)	~ ~	10.0 (0.14)
Lithuania	40 (3.7)	504 (6.0)	59 (3.7)	501 (3.5)	1 (0.4)	~ ~	9.9 (0.10)
Lebanon	39 (4.1)	466 (6.1)	53 (4.3)	443 (5.2)	8 (2.6)	411 (12.7)	9.8 (0.19)
Turkey	38 (3.2)	483 (8.3)	49 (3.3)	441 (5.8)	13 (2.1)	407 (7.6)	9.3 (0.12)
Indonesia	37 (4.1)	387 (6.3)	61 (4.2)	386 (6.2)	2 (1.0)	~ ~	10.0 (0.16)
Oman	37 (3.0)	384 (4.9)	61 (3.0)	357 (4.1)	2 (1.1)	~ ~	9.9 (0.12)
Ghana	36 (3.6)	355 (8.6)	55 (3.8)	316 (5.3)	9 (2.0)	320 (12.7)	9.6 (0.17)
Palestinian Nat'l Auth.	36 (4.4)	403 (6.1)	54 (4.2)	407 (5.3)	10 (2.6)	385 (14.5)	9.5 (0.18)
Jordan	36 (3.6)	418 (5.6)	59 (3.7)	403 (5.7)	5 (1.5)	355 (21.9)	9.6 (0.13)
Chile	34 (3.4)	447 (6.5)	51 (4.1)	408 (4.0)	15 (3.1)	376 (6.9)	9.4 (0.18)
Finland	31 (3.4)	519 (4.4)	63 (3.6)	512 (2.6)	6 (1.6)	508 (9.3)	9.4 (0.11)
Chinese Taipei	31 (3.7)	627 (6.7)	57 (3.8)	603 (5.0)	12 (2.7)	593 (10.9)	9.1 (0.15)
Sweden r	31 (3.3)	495 (4.1)	67 (3.2)	483 (2.7)	3 (0.8)	446 (13.9)	9.5 (0.12)
Morocco	26 (2.3)	399 (6.0)	59 (3.3)	364 (2.8)	16 (2.4)	355 (5.5)	9.0 (0.10)
Tunisia	22 (3.1)	419 (6.4)	61 (3.4)	427 (4.5)	17 (2.8)	424 (6.1)	8.8 (0.15)
Slovenia	19 (2.4)	511 (4.9)	75 (2.5)	503 (2.6)	7 (1.6)	502 (9.3)	9.0 (0.10)
Italy	17 (2.9)	509 (4.2)	76 (3.1)	499 (3.3)	8 (2.1)	474 (11.1)	8.9 (0.12)
Japan	14 (3.0)	593 (10.5)	71 (3.6)	567 (3.1)	15 (2.6)	560 (5.1)	8.5 (0.13)
Korea, Rep. of	13 (2.4)	624 (8.3)	74 (2.9)	611 (3.6)	13 (2.3)	607 (8.5)	8.5 (0.11)
International Avg.	45 (0.5)	479 (1.0)	49 (0.6)	458 (0.9)	6 (0.3)	445 (3.1)	

Centerpoint of scale set at 10.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 6.8: Safe and Orderly School (Continued)

Country	Safe and Orderly		Somewhat Safe and Orderly		Not Safe and Orderly		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Ninth Grade Participants							
Honduras	36 (4.2)	346 (9.0)	51 (4.5)	331 (5.1)	13 (2.6)	339 (8.9)	9.6 (0.20)
South Africa	21 (2.8)	379 (11.0)	55 (3.7)	347 (4.2)	24 (3.0)	341 (5.3)	8.5 (0.15)
Botswana	12 (3.0)	414 (10.4)	55 (4.2)	398 (3.5)	33 (3.9)	390 (3.8)	8.0 (0.17)
Benchmarking Participants							
Dubai, UAE	80 (2.3)	483 (3.3)	18 (2.2)	453 (9.4)	2 (0.4)	~ ~	11.3 (0.09)
Minnesota, US	69 (5.2)	552 (6.0)	31 (5.2)	529 (11.2)	0 (0.0)	~ ~	11.4 (0.20)
Alberta, Canada	68 (3.9)	508 (3.5)	27 (3.6)	496 (4.1)	5 (1.8)	501 (9.7)	11.1 (0.18)
Massachusetts, US	65 (4.7)	573 (6.9)	27 (3.9)	546 (13.3)	7 (2.8)	490 (13.9)	11.0 (0.24)
Colorado, US r	62 (5.6)	538 (5.0)	33 (5.6)	490 (12.3)	4 (1.7)	460 (37.2)	11.0 (0.22)
Abu Dhabi, UAE	62 (3.7)	457 (5.9)	38 (3.7)	439 (5.7)	0 (0.3)	~ ~	10.7 (0.13)
North Carolina, US r	58 (7.0)	539 (8.4)	36 (6.5)	535 (9.4)	6 (3.2)	605 (28.6)	10.6 (0.29)
Indiana, US r	55 (7.5)	526 (7.6)	43 (7.6)	511 (9.3)	2 (1.4)	~ ~	10.6 (0.25)
Connecticut, US	54 (5.2)	549 (7.3)	39 (5.6)	483 (9.8)	7 (3.7)	504 (54.7)	10.5 (0.25)
Ontario, Canada	52 (4.4)	524 (3.2)	44 (4.5)	501 (3.8)	4 (1.5)	492 (5.7)	10.6 (0.19)
California, US r	49 (5.7)	512 (6.8)	37 (5.5)	476 (12.9)	14 (4.6)	466 (19.6)	10.1 (0.30)
Alabama, US r	44 (7.3)	492 (11.3)	47 (7.4)	451 (8.3)	9 (3.6)	435 (31.4)	9.8 (0.29)
Quebec, Canada	38 (3.8)	545 (5.1)	59 (3.7)	525 (3.1)	3 (1.2)	526 (17.6)	9.9 (0.15)
Florida, US r	37 (6.4)	533 (10.4)	52 (6.2)	511 (9.7)	11 (4.4)	531 (37.5)	9.5 (0.24)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Thinking about your current school, indicate the extent to which you agree or disagree with each of the following statements.

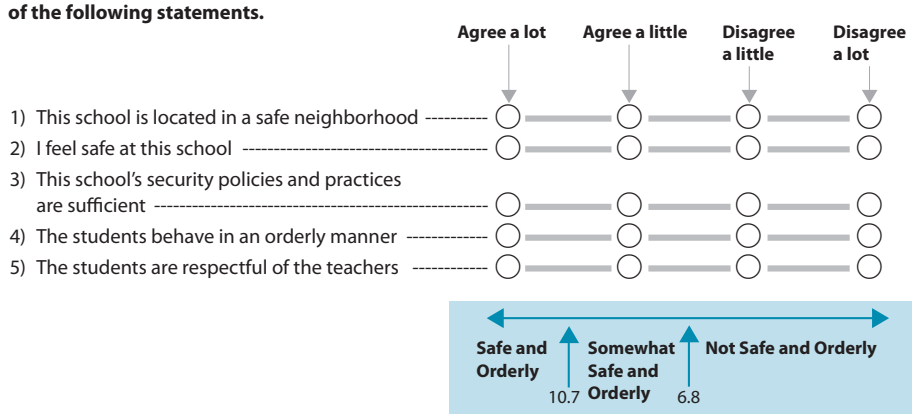


Exhibit 6.9: School Discipline and Safety

TIMSS 2011 4th Grade Mathematics

Reported by Principals

Students were scored according to their principals' responses concerning ten potential school problems on the *School Discipline and Safety* scale. Students in schools with **Hardly Any Problems** had a score on the scale of at least 9.7, which corresponds to their principals reporting "not a problem" for five of the ten discipline and safety issues and "minor problem" for the other five, on average. Students in schools with **Moderate Problems** had a score no higher than 7.6, which corresponds to their principals reporting "moderate problem" for five of the ten issues and "minor problem" for the other five, on average. All other students attended schools with **Minor Problems**.

Country	Hardly Any Problems		Minor Problems		Moderate Problems		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Kazakhstan	91 (2.2)	505 (5.0)	9 (2.4)	465 (13.3)	1 (0.6)	~ ~	11.1 (0.10)
Armenia	87 (2.7)	450 (3.8)	8 (2.3)	460 (11.8)	4 (1.7)	479 (20.6)	11.1 (0.12)
Northern Ireland	85 (3.7)	566 (3.8)	15 (3.7)	542 (7.7)	0 (0.0)	~ ~	11.0 (0.13)
Netherlands r	85 (3.6)	544 (2.2)	15 (3.6)	524 (6.9)	0 (0.0)	~ ~	11.3 (0.16)
Hong Kong SAR	84 (2.9)	606 (3.0)	15 (2.8)	574 (16.0)	1 (0.0)	~ ~	11.2 (0.12)
Ireland	83 (3.1)	532 (2.9)	16 (3.0)	512 (9.9)	1 (1.0)	~ ~	11.1 (0.13)
Georgia	81 (2.8)	449 (4.7)	13 (2.4)	447 (9.8)	6 (1.4)	471 (14.3)	10.7 (0.15)
Spain	80 (3.3)	487 (2.7)	12 (2.8)	459 (10.1)	8 (2.3)	481 (14.2)	10.7 (0.17)
Chinese Taipei	77 (3.3)	591 (2.5)	23 (3.3)	591 (4.2)	0 (0.0)	~ ~	11.4 (0.13)
England	77 (4.1)	551 (4.2)	20 (4.2)	515 (11.0)	3 (1.6)	495 (10.9)	10.6 (0.11)
Korea, Rep. of	76 (3.6)	606 (2.3)	18 (3.4)	599 (3.9)	6 (2.0)	596 (7.5)	10.9 (0.15)
Lithuania	75 (3.5)	538 (2.8)	25 (3.5)	523 (5.8)	0 (0.0)	~ ~	10.5 (0.11)
Iran, Islamic Rep. of	74 (3.9)	437 (4.6)	25 (3.9)	417 (7.8)	0 (0.0)	~ ~	10.7 (0.11)
Japan	72 (3.2)	585 (1.9)	24 (3.3)	587 (4.8)	4 (1.6)	582 (10.4)	10.5 (0.12)
New Zealand	69 (3.4)	502 (3.3)	28 (3.2)	458 (5.5)	3 (1.3)	419 (15.2)	10.7 (0.12)
Czech Republic	68 (3.6)	512 (3.0)	29 (3.5)	506 (5.1)	2 (1.0)	~ ~	10.2 (0.11)
Belgium (Flemish)	67 (4.4)	553 (2.2)	32 (4.3)	545 (3.9)	1 (0.0)	~ ~	10.4 (0.13)
Singapore	67 (0.0)	606 (3.9)	33 (0.0)	603 (6.0)	0 (0.0)	~ ~	10.7 (0.00)
Croatia	66 (4.0)	492 (2.6)	31 (4.0)	484 (3.8)	2 (1.2)	~ ~	10.4 (0.12)
Portugal	66 (5.4)	536 (4.1)	30 (5.5)	525 (7.9)	5 (1.7)	529 (18.7)	10.3 (0.17)
Russian Federation	65 (3.9)	545 (4.5)	35 (3.8)	536 (5.4)	0 (0.5)	~ ~	10.1 (0.09)
United States	64 (2.7)	551 (3.0)	34 (2.6)	531 (3.3)	2 (0.7)	~ ~	10.3 (0.09)
Australia	64 (3.9)	523 (4.1)	34 (3.8)	511 (5.3)	2 (1.0)	~ ~	10.4 (0.12)
Finland	64 (4.5)	549 (2.5)	34 (4.4)	540 (4.8)	2 (1.2)	~ ~	10.2 (0.12)
Romania	64 (4.1)	495 (5.6)	23 (3.4)	478 (12.3)	13 (2.9)	430 (27.6)	10.2 (0.17)
Malta	64 (0.1)	503 (1.8)	30 (0.1)	486 (2.4)	6 (0.1)	473 (4.9)	10.1 (0.00)
Bahrain	63 (4.2)	438 (4.8)	25 (4.1)	430 (9.2)	12 (4.7)	437 (7.4)	10.1 (0.30)
Qatar	63 (3.2)	430 (5.1)	23 (2.6)	391 (10.1)	14 (2.3)	373 (10.2)	9.9 (0.14)
Azerbaijan	62 (4.2)	461 (7.6)	8 (2.3)	462 (13.8)	30 (3.9)	466 (9.3)	9.5 (0.26)
United Arab Emirates	61 (2.3)	444 (2.9)	24 (2.0)	411 (4.6)	15 (1.7)	415 (6.8)	9.9 (0.11)
Denmark r	60 (4.0)	543 (3.4)	40 (4.0)	535 (4.1)	1 (0.0)	~ ~	10.0 (0.09)
Norway	58 (4.4)	495 (3.7)	39 (4.2)	492 (4.0)	3 (1.6)	485 (10.1)	9.9 (0.13)
Thailand	58 (4.6)	469 (4.8)	36 (4.4)	444 (9.0)	6 (2.3)	442 (21.5)	10.1 (0.16)
Slovak Republic	57 (3.6)	513 (3.7)	35 (3.4)	503 (7.5)	9 (2.0)	477 (16.9)	9.9 (0.12)
Italy	56 (3.9)	509 (3.8)	25 (3.8)	509 (5.9)	19 (2.9)	505 (6.3)	9.5 (0.14)
Serbia	55 (4.7)	514 (4.8)	30 (4.2)	524 (5.8)	15 (3.2)	506 (6.9)	9.7 (0.18)
Slovenia	53 (3.7)	512 (3.4)	42 (3.6)	516 (3.6)	4 (1.4)	500 (5.6)	10.0 (0.12)
Poland	51 (3.9)	481 (3.0)	46 (4.2)	481 (3.2)	3 (1.4)	493 (14.4)	9.7 (0.09)
Hungary	50 (4.2)	530 (4.8)	45 (4.2)	509 (6.0)	5 (1.5)	433 (24.6)	9.7 (0.13)
Sweden	49 (4.7)	514 (2.8)	45 (4.7)	495 (3.7)	6 (1.2)	479 (12.7)	9.7 (0.13)
Austria	46 (4.3)	513 (3.4)	42 (4.1)	508 (3.7)	12 (3.3)	492 (9.1)	9.4 (0.14)
Saudi Arabia	45 (3.9)	417 (6.2)	25 (3.8)	395 (13.8)	30 (3.8)	414 (9.8)	9.1 (0.18)
Germany	41 (3.3)	539 (3.1)	53 (3.5)	526 (3.0)	6 (1.5)	487 (7.8)	9.5 (0.08)
Chile	39 (3.4)	481 (5.0)	43 (4.1)	459 (4.6)	18 (2.9)	439 (6.4)	9.2 (0.14)
Turkey	38 (2.9)	491 (6.8)	35 (3.4)	464 (7.2)	26 (3.4)	445 (12.0)	8.9 (0.14)
Oman	28 (2.9)	385 (4.8)	37 (3.1)	374 (4.6)	35 (3.0)	380 (6.2)	8.4 (0.15)
Tunisia	26 (3.3)	362 (7.1)	27 (3.2)	357 (7.9)	46 (4.0)	359 (6.2)	8.0 (0.19)
Kuwait	24 (3.5)	348 (6.8)	48 (4.2)	345 (5.0)	29 (3.6)	332 (7.3)	8.4 (0.15)
Morocco	14 (2.4)	340 (9.1)	24 (3.1)	317 (7.6)	62 (3.9)	342 (6.1)	7.2 (0.15)
Yemen	13 (2.8)	263 (12.4)	33 (4.1)	259 (10.5)	54 (4.0)	238 (9.7)	7.5 (0.16)
International Avg.	61 (0.5)	496 (0.7)	29 (0.5)	482 (1.1)	11 (0.3)	451 (2.2)	

Centerpoint of scale set at 10.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

TIMSS & PIRLS International Study Center
Lynch School of Education, Boston College

Exhibit 6.9: School Discipline and Safety (Continued)

Country	Hardly Any Problems		Minor Problems		Moderate Problems		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Sixth Grade Participants							
Honduras	44 (4.5)	403 (9.9)	37 (4.9)	395 (10.2)	19 (3.3)	382 (8.1)	9.1 (0.17)
Botswana	27 (3.9)	443 (10.9)	58 (4.2)	416 (4.4)	14 (2.9)	385 (8.2)	9.0 (0.12)
Yemen	13 (3.0)	372 (14.2)	34 (4.3)	345 (7.7)	53 (4.0)	341 (9.1)	7.5 (0.15)
Benchmarking Participants							
Dubai, UAE	74 (0.4)	481 (1.9)	17 (0.4)	420 (5.1)	10 (0.1)	443 (4.1)	10.6 (0.01)
Alberta, Canada	68 (4.3)	511 (3.2)	32 (4.3)	500 (3.7)	0 (0.0)	~ ~	10.5 (0.13)
Ontario, Canada	66 (4.5)	522 (3.5)	33 (4.6)	512 (5.1)	1 (0.9)	~ ~	10.4 (0.13)
Abu Dhabi, UAE	63 (4.2)	427 (5.9)	25 (4.0)	392 (8.0)	12 (2.8)	386 (10.7)	9.9 (0.18)
Florida, US r	60 (6.5)	552 (5.7)	40 (6.5)	533 (4.0)	0 (0.0)	~ ~	10.3 (0.21)
North Carolina, US	59 (7.5)	564 (5.6)	41 (7.5)	544 (9.1)	0 (0.0)	~ ~	10.1 (0.23)
Quebec, Canada	56 (4.3)	538 (3.3)	40 (4.1)	528 (3.7)	4 (1.9)	509 (12.1)	9.9 (0.12)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

To what degree is each of the following a problem among fourth grade students in your school?

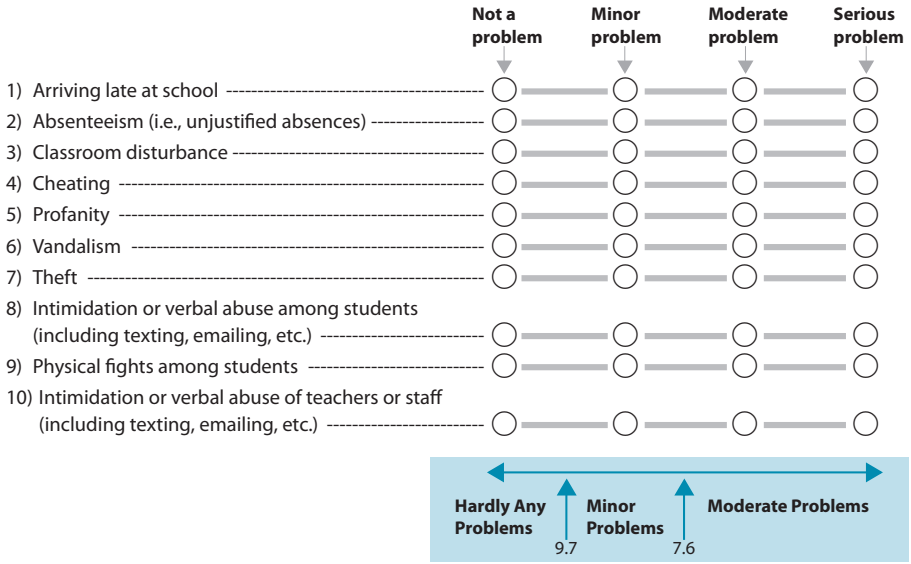


Exhibit 6.10: School Discipline and Safety

TIMSS 2011 8th Grade Mathematics

Reported by Principals

Students were scored according to their principals' responses concerning eleven potential school problems on the *School Discipline and Safety* scale. Students in schools with **Hardly Any Problems** had a score on the scale of at least 10.7, which corresponds to their principals reporting "not a problem" for six of the eleven discipline and safety issues and "minor problem" for the other five, on average. Students in schools with **Moderate Problems** had a score no higher than 8.0, which corresponds to their principals reporting "moderate problem" for six of the eleven issues and "minor problem" for the other five, on average. All other students attended schools with **Minor Problems.**

Country	Hardly Any Problems		Minor Problems		Moderate Problems		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Kazakhstan	81 (3.5)	487 (5.0)	19 (3.5)	486 (7.4)	0 (0.0)	~ ~	11.8 (0.11)
Iran, Islamic Rep. of	66 (3.3)	423 (6.0)	33 (3.3)	400 (5.4)	1 (0.6)	~ ~	11.4 (0.11)
Armenia	66 (4.0)	470 (4.1)	29 (3.9)	460 (7.8)	6 (1.9)	469 (10.8)	11.0 (0.13)
Chinese Taipei	64 (4.1)	611 (4.7)	35 (4.2)	606 (6.8)	1 (0.8)	~ ~	11.4 (0.15)
Georgia	61 (3.2)	425 (5.1)	35 (3.3)	442 (6.9)	3 (1.4)	445 (27.7)	10.8 (0.10)
Ukraine	59 (4.5)	484 (5.5)	33 (4.3)	474 (5.9)	7 (2.4)	465 (15.9)	10.7 (0.16)
Qatar	52 (0.6)	415 (5.2)	36 (0.3)	403 (2.9)	12 (0.4)	391 (7.5)	10.6 (0.04)
Singapore	51 (0.0)	623 (4.6)	49 (0.0)	597 (5.7)	0 (0.0)	~ ~	10.9 (0.00)
Hong Kong SAR	51 (4.6)	615 (7.0)	49 (4.7)	554 (7.6)	1 (0.0)	~ ~	10.9 (0.15)
Russian Federation	50 (3.4)	550 (5.1)	50 (3.5)	528 (5.4)	0 (0.4)	~ ~	10.5 (0.07)
Romania	50 (3.9)	464 (5.5)	41 (3.7)	461 (7.9)	9 (2.6)	411 (14.8)	10.5 (0.17)
Indonesia	47 (4.0)	396 (5.8)	39 (4.7)	379 (7.9)	14 (3.1)	371 (11.0)	10.3 (0.13)
United Arab Emirates	47 (2.0)	469 (3.1)	36 (2.4)	442 (4.7)	17 (1.4)	446 (4.8)	10.2 (0.08)
Lebanon	47 (4.4)	460 (5.6)	39 (4.4)	443 (7.1)	14 (2.9)	428 (7.4)	10.2 (0.20)
Saudi Arabia	46 (4.6)	393 (5.6)	26 (3.8)	397 (10.6)	29 (3.9)	395 (9.4)	9.7 (0.22)
Japan	45 (4.1)	579 (4.8)	35 (4.1)	568 (4.8)	20 (3.3)	551 (4.3)	10.0 (0.18)
Oman	43 (3.3)	388 (3.9)	33 (3.2)	343 (6.1)	25 (2.9)	357 (6.7)	9.8 (0.19)
England	41 (4.6)	531 (9.1)	58 (4.7)	492 (8.6)	1 (0.0)	~ ~	10.6 (0.14)
Macedonia, Rep. of	38 (3.9)	436 (8.5)	49 (4.0)	428 (7.5)	13 (2.1)	403 (16.9)	10.0 (0.15)
Korea, Rep. of	38 (3.7)	617 (3.8)	50 (4.2)	614 (3.6)	13 (3.0)	595 (7.9)	10.1 (0.17)
Bahrain	37 (0.3)	412 (3.0)	49 (0.3)	407 (2.6)	14 (0.2)	411 (7.2)	10.0 (0.01)
Thailand	34 (4.1)	428 (9.1)	61 (4.3)	425 (6.4)	5 (1.8)	448 (22.3)	10.1 (0.13)
Australia	33 (3.8)	538 (10.7)	62 (3.9)	496 (5.6)	5 (1.5)	458 (18.4)	10.1 (0.10)
Ghana	33 (4.3)	353 (7.5)	62 (4.2)	322 (5.7)	6 (1.9)	296 (10.4)	10.0 (0.13)
Slovenia	32 (3.5)	500 (3.6)	61 (4.0)	510 (2.5)	7 (2.3)	485 (6.7)	9.9 (0.11)
Norway	32 (4.7)	482 (3.8)	64 (4.7)	472 (3.0)	4 (1.7)	459 (10.8)	10.1 (0.13)
United States	30 (2.3)	518 (4.8)	66 (2.3)	509 (3.7)	4 (0.8)	474 (19.5)	10.1 (0.07)
Italy	30 (3.3)	508 (4.1)	48 (3.3)	500 (4.7)	23 (2.7)	484 (5.0)	9.4 (0.13)
Chile	29 (3.9)	448 (7.5)	54 (4.5)	412 (4.2)	16 (3.4)	380 (5.2)	9.6 (0.15)
Palestinian Nat'l Auth.	27 (3.7)	412 (6.4)	44 (3.7)	402 (6.5)	29 (3.4)	400 (7.9)	9.1 (0.20)
Finland	27 (4.1)	526 (3.9)	70 (4.1)	509 (2.6)	3 (1.5)	498 (7.7)	9.9 (0.11)
Turkey	26 (3.1)	485 (9.8)	49 (3.4)	444 (5.2)	25 (2.7)	434 (8.1)	9.2 (0.14)
Lithuania	26 (3.5)	490 (7.0)	72 (3.7)	507 (3.0)	2 (1.1)	~ ~	10.1 (0.11)
Israel	26 (3.9)	534 (7.6)	58 (4.2)	526 (5.6)	16 (2.6)	465 (14.8)	9.4 (0.16)
Malaysia	25 (3.8)	469 (10.1)	72 (4.0)	433 (6.3)	3 (1.2)	349 (15.1)	9.9 (0.10)
New Zealand	23 (3.5)	506 (11.0)	74 (3.9)	483 (6.0)	3 (1.7)	482 (30.1)	9.7 (0.09)
Jordan	22 (3.0)	416 (8.4)	51 (4.0)	406 (4.9)	27 (3.6)	397 (7.5)	9.1 (0.14)
Hungary	22 (3.5)	525 (6.4)	68 (3.9)	506 (4.2)	10 (2.5)	450 (13.7)	9.6 (0.11)
Sweden r	18 (4.1)	498 (5.6)	80 (4.4)	482 (2.5)	3 (1.5)	463 (10.2)	9.5 (0.10)
Morocco	13 (2.0)	389 (7.3)	38 (3.6)	360 (4.7)	49 (3.4)	376 (3.4)	8.2 (0.13)
Syrian Arab Republic	11 (2.5)	386 (13.7)	21 (3.8)	391 (10.1)	68 (4.1)	376 (5.4)	7.4 (0.19)
Tunisia	9 (1.8)	421 (7.2)	44 (3.9)	423 (3.9)	47 (3.9)	428 (4.4)	8.1 (0.12)
International Avg.	38 (0.5)	478 (1.0)	49 (0.6)	463 (0.9)	13 (0.4)	434 (2.2)	

Centerpoint of scale set at 10.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students.

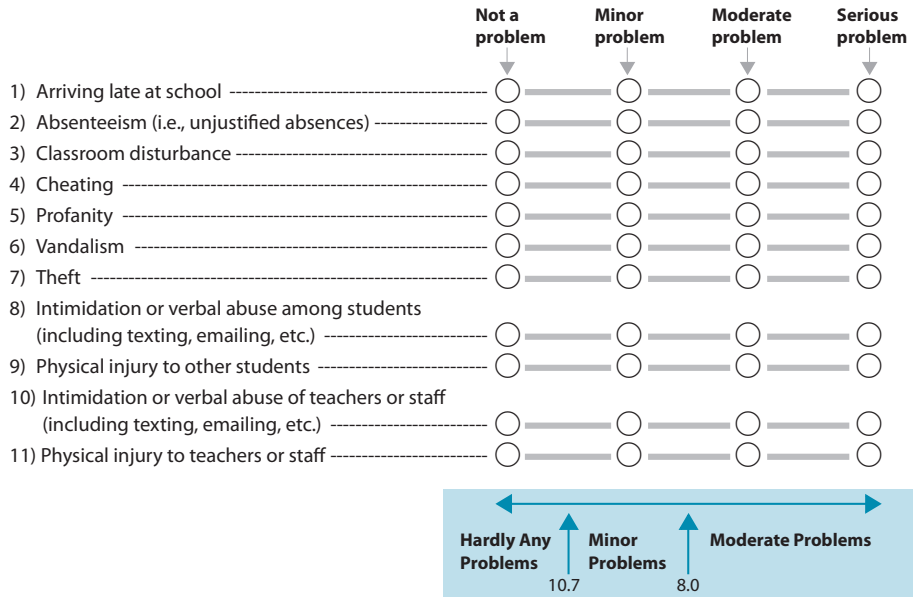
SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 6.10: School Discipline and Safety (Continued)

Country	Hardly Any Problems		Minor Problems		Moderate Problems		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Ninth Grade Participants							
Honduras	35 (4.2)	349 (8.8)	51 (4.8)	332 (4.6)	14 (3.2)	325 (7.6)	9.8 (0.15)
South Africa	8 (2.1)	367 (19.4)	63 (3.6)	355 (3.9)	29 (3.3)	338 (5.3)	8.8 (0.10)
Botswana	5 (1.8)	403 (14.7)	70 (3.7)	399 (3.1)	25 (3.6)	384 (5.6)	8.8 (0.09)
Benchmarking Participants							
Dubai, UAE	62 (0.4)	486 (3.1)	25 (0.4)	471 (4.0)	13 (0.1)	447 (3.3)	10.9 (0.01)
Massachusetts, US	49 (7.2)	582 (9.3)	41 (7.0)	538 (6.6)	9 (4.4)	530 (15.7)	10.6 (0.20)
Abu Dhabi, UAE	41 (3.9)	468 (6.0)	43 (4.5)	435 (9.1)	16 (3.2)	437 (7.8)	10.1 (0.18)
Minnesota, US	37 (6.3)	553 (11.7)	59 (6.9)	542 (5.2)	4 (3.5)	544 (20.5)	10.2 (0.22)
Ontario, Canada	36 (4.3)	515 (3.5)	58 (4.3)	512 (3.6)	6 (2.2)	488 (14.0)	10.2 (0.14)
Alberta, Canada	32 (3.9)	515 (4.7)	68 (3.9)	501 (3.1)	0 (0.0)	~ ~	10.3 (0.12)
Quebec, Canada	31 (3.7)	544 (4.1)	63 (4.2)	527 (3.9)	6 (2.0)	523 (12.8)	10.0 (0.11)
Florida, US	27 (7.4)	511 (19.0)	69 (7.7)	514 (8.2)	4 (2.5)	496 (28.5)	9.8 (0.22)
Indiana, US r	27 (7.1)	541 (10.9)	71 (7.5)	520 (6.6)	2 (0.1)	~ ~	10.2 (0.18)
Colorado, US	25 (6.3)	538 (8.1)	72 (7.0)	511 (7.7)	3 (0.2)	497 (3.5)	9.8 (0.18)
Connecticut, US r	24 (4.7)	558 (11.3)	76 (4.7)	507 (7.8)	0 (0.0)	~ ~	10.1 (0.11)
Alabama, US r	23 (7.5)	488 (15.0)	72 (7.4)	463 (8.6)	5 (2.9)	420 (11.9)	9.9 (0.23)
North Carolina, US	17 (5.2)	547 (21.6)	82 (5.4)	533 (8.7)	1 (0.1)	~ ~	9.7 (0.19)
California, US r	14 (6.1)	497 (6.1)	77 (6.2)	500 (6.5)	8 (2.6)	407 (16.5)	9.6 (0.20)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

To what degree is each of the following a problem among eighth grade students in your school?



Students Bullied at School

In general, bullying involves aggression or negative behavior intended to harm or bother less physically or psychologically powerful persons, although a New Zealand review of the literature found a range of definitions and terminology relating bullying to violence and abuse (Carroll-Lind, 2009). There is growing evidence that bullying in schools is on the rise, especially with the emergence of cyber-bullying, and that bullying does have a negative impact on students' educational achievement. To provide data about bullying in the participating countries, TIMSS 2011 created the Students Bullied at School scale, based on how often students experienced six bullying behaviors:

- I was made fun of or called names;
- I was left out of games or activities by other students;
- Someone spread lies about me;
- Something was stolen from me;
- I was hit or hurt by other student(s); and
- I was made to do things I didn't want to do by other students.

Exhibit 6.11 provides the results for the Students Bullied at School scale for the TIMSS 2011 fourth grade assessment. Students were scored according to their responses to how often they experienced six bullying behaviors (detailed on the second page of the exhibit). Students bullied **Almost Never** reported never experiencing three of six bullying behaviors and each of the other three behaviors "a few times a year," on average. Internationally, across the fourth-grade countries, 48 percent of the students, on average, **Almost Never** experienced these bullying behaviors. However, the percentages ranged from 17 to 80 percent.

The majority of fourth grade students reported being bullied either **About Monthly** or **About Weekly**. Internationally, on average across the fourth grade countries, 32 percent of the students were reportedly bullied **About Monthly** and 20 percent were bullied **About Weekly**. Students bullied **About Weekly** reported experiencing each of three of the six behaviors "once or twice a month" (bullied 3–6 times a month) and, in addition, each of the other three "a few times a year," on average.

The fourth grade students' reports about being bullied were related to their average mathematics achievement on TIMSS 2011. Each successive category of increased bullying was related to a decrease in average mathematics

achievement to the extent that there was a 32-point difference in achievement between **Almost Never** being bullied and being bullied **About Weekly** (501 vs. 469).

Exhibit 6.12 provides the results for the TIMSS 2011 eighth grade assessment for the Students Bullied at School scale, which was based on the same six bullying behaviors (detailed on the second page of the exhibit) as the fourth grade scale. In contrast to the previous section, where principals reported more school discipline and safety problems at the eighth than at the fourth grade, the eighth grade students reported experiencing somewhat less bullying behavior than the fourth grade students. On average internationally, the majority of eighth grade students (59%) **Almost Never** experienced these bullying behaviors, compared to 48 percent at the fourth grade, whereas just 12 percent of the eighth grade students reported being bullied **About Weekly**, compared to 20 percent at the fourth grade. Similar to the fourth grade, there was a negative relationship between eighth grade students' reports about being bullied and average mathematics achievement, with students who were **Almost Never** bullied having achievement 32 points higher than students who reported being bullied **About Weekly** (473 vs. 441).

Exhibit 6.11: Students Bullied at School

TIMSS 2011 Mathematics 4th Grade

Reported by Students

Students were scored according to their responses to how often they experienced six bullying behaviors on the *Students Bullied at School* scale. Students bullied **Almost Never** had a score on the scale of at least 10.1, which corresponds to "never" experiencing three of the six bullying behaviors and each of the other three behaviors "a few times a year," on average. Students bullied **About Weekly** had a score no higher than 8.3, which corresponds to their experiencing each of three of the six behaviors "once or twice a month" and each of the other three "a few times a year," on average. All other students were bullied **About Monthly.**

Country	Almost Never		About Monthly		About Weekly		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Armenia	80 (0.8)	459 (3.5)	13 (0.7)	447 (5.6)	7 (0.5)	408 (6.4)	11.5 (0.05)
Azerbaijan	75 (1.5)	483 (6.0)	16 (1.0)	454 (6.5)	9 (0.7)	418 (7.8)	11.4 (0.08)
Sweden	68 (1.0)	509 (2.1)	25 (1.0)	498 (3.4)	7 (0.5)	483 (5.8)	10.9 (0.04)
Georgia	66 (1.2)	464 (3.0)	23 (0.8)	451 (5.6)	11 (0.8)	407 (8.8)	10.9 (0.06)
Kazakhstan	64 (1.7)	503 (4.2)	23 (1.2)	512 (6.4)	13 (0.9)	489 (8.0)	10.8 (0.08)
Ireland	64 (1.3)	539 (2.7)	25 (1.0)	522 (3.4)	12 (0.9)	486 (5.0)	10.7 (0.06)
Croatia	61 (1.1)	497 (2.3)	28 (0.9)	487 (3.0)	11 (0.6)	462 (4.8)	10.6 (0.05)
Finland	61 (1.2)	549 (2.5)	30 (0.9)	546 (3.4)	9 (0.6)	523 (5.0)	10.5 (0.04)
Poland	61 (0.9)	487 (2.4)	26 (0.7)	481 (2.9)	13 (0.6)	462 (4.1)	10.6 (0.04)
Denmark	60 (1.1)	544 (2.4)	31 (0.8)	535 (3.2)	9 (0.7)	513 (5.7)	10.5 (0.04)
Serbia	57 (1.2)	523 (3.4)	30 (0.9)	520 (4.1)	13 (0.7)	484 (7.1)	10.5 (0.06)
Northern Ireland	57 (1.3)	571 (3.4)	29 (1.0)	565 (4.1)	14 (1.0)	528 (7.3)	10.4 (0.06)
Austria	53 (1.3)	513 (3.0)	30 (0.9)	510 (3.5)	17 (0.9)	493 (3.4)	10.2 (0.05)
Norway	53 (1.8)	502 (3.1)	33 (1.1)	493 (3.6)	14 (0.9)	473 (7.0)	10.2 (0.06)
Korea, Rep. of	53 (1.2)	608 (2.2)	32 (0.8)	608 (2.3)	15 (0.6)	592 (3.9)	10.3 (0.05)
Chinese Taipei	53 (1.3)	597 (2.1)	30 (0.8)	592 (2.7)	17 (0.8)	573 (3.6)	10.2 (0.05)
United States	51 (0.7)	549 (2.1)	29 (0.5)	544 (2.0)	20 (0.6)	520 (3.2)	10.1 (0.03)
Italy	51 (1.2)	514 (3.1)	33 (1.0)	509 (3.0)	16 (0.7)	491 (3.9)	10.2 (0.05)
Slovenia	50 (1.3)	520 (2.5)	32 (0.8)	517 (2.7)	18 (1.0)	488 (3.5)	10.0 (0.05)
Japan	50 (1.2)	588 (2.1)	33 (0.8)	589 (2.8)	17 (0.8)	574 (3.3)	10.1 (0.05)
Hong Kong SAR	50 (1.2)	608 (3.1)	33 (0.9)	604 (3.5)	17 (0.7)	582 (7.1)	10.1 (0.04)
Portugal	49 (1.4)	536 (4.0)	35 (1.2)	535 (3.8)	17 (0.9)	515 (4.8)	10.1 (0.06)
Germany	48 (1.2)	537 (2.7)	36 (0.9)	530 (2.4)	16 (0.8)	511 (4.0)	10.1 (0.05)
Lithuania	48 (1.3)	543 (3.0)	36 (0.9)	534 (2.6)	17 (0.8)	508 (4.1)	10.0 (0.05)
Romania	47 (1.8)	504 (5.9)	32 (1.5)	475 (6.4)	21 (1.1)	450 (8.7)	9.9 (0.07)
Slovak Republic	46 (1.1)	517 (3.4)	34 (0.8)	505 (4.6)	20 (0.9)	488 (4.8)	9.9 (0.05)
Czech Republic	46 (1.2)	519 (2.8)	34 (1.0)	514 (3.1)	20 (0.8)	488 (4.5)	10.0 (0.05)
Netherlands	46 (1.2)	543 (1.7)	37 (1.1)	543 (2.3)	17 (0.9)	526 (3.1)	9.9 (0.05)
Russian Federation	45 (1.4)	549 (4.3)	35 (1.0)	540 (4.0)	19 (1.0)	530 (4.9)	10.0 (0.06)
England	45 (1.3)	549 (4.2)	36 (1.0)	548 (4.5)	20 (0.8)	519 (5.3)	9.8 (0.05)
Spain	44 (1.3)	488 (3.1)	34 (0.9)	487 (3.3)	23 (1.0)	469 (3.8)	9.8 (0.05)
Yemen	42 (2.1)	260 (6.8)	31 (1.4)	256 (6.9)	27 (1.8)	233 (8.7)	9.7 (0.11)
Malta	42 (0.7)	507 (1.7)	36 (0.7)	499 (2.5)	22 (0.6)	471 (2.6)	9.7 (0.03)
Iran, Islamic Rep. of	41 (1.7)	431 (5.0)	35 (1.2)	434 (4.0)	23 (1.3)	428 (5.0)	9.8 (0.07)
Hungary	40 (1.1)	521 (5.6)	36 (0.8)	525 (3.3)	24 (0.8)	497 (4.4)	9.7 (0.04)
Singapore	39 (0.9)	618 (3.3)	38 (0.6)	610 (3.3)	23 (0.8)	582 (4.2)	9.7 (0.03)
Saudi Arabia	39 (1.7)	422 (5.6)	33 (1.2)	419 (6.2)	27 (1.2)	386 (6.7)	9.6 (0.08)
Tunisia	39 (1.4)	377 (4.8)	37 (1.1)	362 (4.1)	24 (1.2)	333 (5.4)	9.7 (0.06)
Belgium (Flemish)	39 (1.1)	556 (2.6)	41 (0.9)	552 (2.2)	20 (0.8)	533 (2.7)	9.7 (0.04)
Chile	38 (1.1)	478 (2.4)	31 (0.9)	467 (2.6)	31 (1.0)	441 (3.2)	9.5 (0.05)
Australia	38 (1.1)	525 (2.9)	38 (1.0)	521 (3.7)	25 (0.7)	498 (4.2)	9.5 (0.04)
Turkey	37 (0.9)	494 (3.8)	33 (0.7)	477 (4.6)	30 (0.9)	442 (5.7)	9.5 (0.04)
Kuwait	37 (1.5)	362 (3.4)	33 (1.0)	358 (4.2)	30 (1.3)	319 (5.5)	9.5 (0.07)
Morocco	35 (1.9)	354 (6.7)	33 (1.1)	338 (4.0)	32 (1.6)	317 (4.8)	9.4 (0.08)
United Arab Emirates	34 (0.8)	454 (2.8)	35 (0.5)	439 (2.6)	31 (0.8)	412 (2.9)	9.4 (0.04)
New Zealand	32 (1.0)	499 (3.4)	37 (1.0)	494 (2.9)	31 (0.9)	468 (4.1)	9.3 (0.04)
Bahrain	31 (1.1)	460 (3.9)	33 (1.1)	442 (4.0)	36 (1.3)	421 (3.9)	9.2 (0.06)
Oman	31 (1.2)	399 (3.3)	37 (0.9)	387 (3.9)	31 (1.0)	372 (4.0)	9.3 (0.05)
Qatar	30 (1.1)	441 (5.4)	32 (1.0)	425 (4.5)	38 (1.0)	392 (3.9)	9.1 (0.05)
Thailand	17 (1.2)	476 (5.9)	35 (1.2)	461 (5.0)	48 (1.6)	451 (5.4)	8.6 (0.06)
International Avg.	48 (0.2)	501 (0.5)	32 (0.1)	493 (0.6)	20 (0.1)	469 (0.7)	

Centerpoint of scale set at 10.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 6.11: Students Bullied at School (Continued)

Country	Almost Never		About Monthly		About Weekly		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Sixth Grade Participants							
Yemen	43 (1.9)	355 (8.0)	34 (1.3)	358 (6.1)	23 (1.3)	330 (7.1)	9.8 (0.08)
Honduras	38 (1.2)	405 (6.3)	32 (0.9)	404 (5.9)	30 (1.2)	384 (5.9)	9.5 (0.06)
Botswana	12 (0.7)	449 (7.5)	41 (0.9)	427 (4.4)	47 (1.1)	410 (3.9)	8.6 (0.03)
Benchmarking Participants							
Florida, US	50 (1.4)	552 (3.6)	29 (0.9)	550 (3.7)	21 (1.1)	526 (4.0)	10.1 (0.06)
North Carolina, US	49 (1.5)	563 (4.6)	32 (1.2)	556 (4.7)	19 (1.1)	534 (5.9)	10.0 (0.06)
Quebec, Canada	44 (1.4)	540 (2.4)	37 (1.1)	534 (3.3)	19 (1.1)	515 (3.5)	9.8 (0.05)
Alberta, Canada	42 (1.3)	514 (3.1)	35 (0.9)	509 (3.2)	22 (1.0)	489 (3.2)	9.7 (0.05)
Ontario, Canada	42 (1.1)	523 (3.2)	36 (0.9)	525 (3.5)	22 (1.0)	501 (4.2)	9.7 (0.04)
Dubai, UAE	37 (1.6)	489 (2.6)	35 (0.9)	476 (3.4)	28 (1.2)	440 (3.8)	9.5 (0.06)
Abu Dhabi, UAE	33 (1.4)	436 (6.1)	36 (0.8)	422 (5.3)	31 (1.4)	398 (5.3)	9.4 (0.07)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

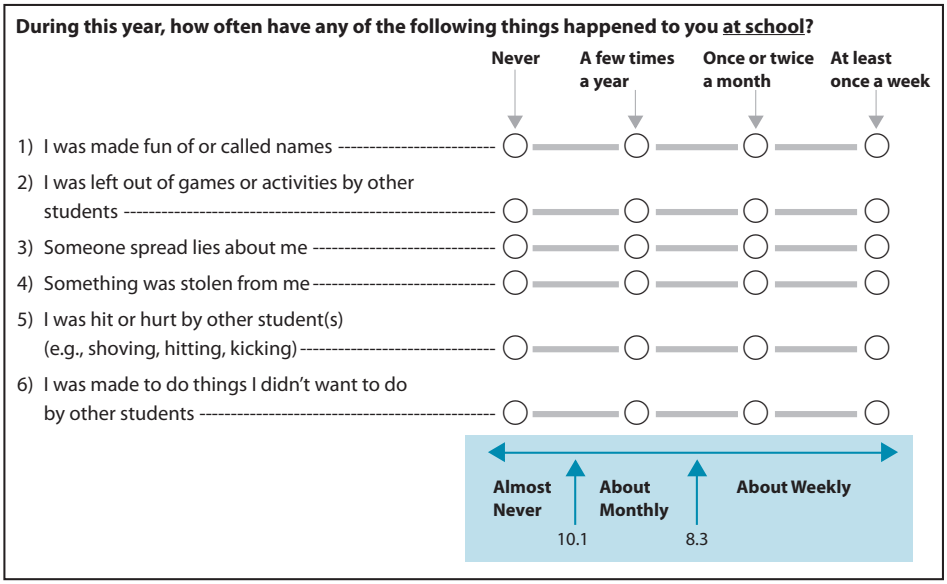


Exhibit 6.12: Students Bullied at School

TIMSS 2011 8th Grade Mathematics

Reported by Students

Students were scored according to their responses to how often they experienced six bullying behaviors on the *Students Bullied at School* scale. Students bullied **Almost Never** had a score on the scale of at least 9.6, which corresponds to "never" experiencing three of the six bullying behaviors and each of the other three behaviors "a few times a year," on average. Students bullied **About Weekly** had a score no higher than 7.7, which corresponds to their experiencing each of three of the six behaviors "once or twice a month" and each of the other three "a few times a year," on average. All other students were bullied **About Monthly**.

Country	Almost Never		About Monthly		About Weekly		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Armenia	87 (0.7)	472 (2.7)	11 (0.6)	462 (5.7)	3 (0.3)	418 (9.7)	11.5 (0.04)
Sweden	79 (0.6)	487 (2.0)	18 (0.5)	482 (2.8)	3 (0.3)	454 (7.6)	10.9 (0.03)
Georgia	79 (0.9)	443 (4.0)	17 (0.8)	425 (5.0)	4 (0.4)	374 (10.0)	11.2 (0.05)
Norway	77 (0.8)	477 (2.6)	19 (0.7)	473 (4.2)	4 (0.3)	446 (10.3)	10.8 (0.04)
Italy	76 (1.1)	502 (2.4)	19 (0.9)	492 (3.7)	5 (0.4)	468 (7.8)	10.7 (0.05)
Kazakhstan	73 (1.1)	487 (4.0)	21 (1.0)	496 (5.2)	5 (0.5)	472 (7.6)	11.0 (0.06)
Finland	71 (0.9)	517 (2.5)	24 (0.8)	509 (3.5)	5 (0.4)	502 (5.0)	10.5 (0.04)
Ukraine	70 (1.2)	486 (4.3)	24 (1.1)	478 (4.4)	6 (0.5)	442 (7.6)	10.4 (0.05)
Russian Federation	69 (0.9)	542 (3.5)	25 (0.7)	538 (4.0)	6 (0.4)	522 (8.5)	10.4 (0.04)
England	68 (1.1)	509 (5.6)	24 (0.7)	511 (6.0)	7 (0.6)	486 (11.1)	10.4 (0.05)
Macedonia, Rep. of	68 (0.9)	445 (5.4)	22 (0.7)	422 (5.6)	10 (0.6)	377 (8.5)	10.3 (0.05)
Chinese Taipei	67 (1.0)	612 (3.7)	26 (0.8)	611 (3.8)	7 (0.4)	580 (5.7)	10.4 (0.05)
Lithuania	65 (1.1)	507 (2.5)	28 (1.0)	504 (3.3)	7 (0.5)	465 (5.1)	10.2 (0.05)
Korea, Rep. of	65 (1.1)	613 (3.1)	28 (0.9)	616 (3.7)	7 (0.5)	603 (5.7)	10.3 (0.05)
Japan	63 (1.2)	566 (3.2)	28 (0.8)	576 (3.4)	9 (0.6)	562 (6.0)	10.3 (0.05)
United States	63 (0.7)	513 (2.7)	28 (0.6)	510 (3.5)	9 (0.3)	496 (3.3)	10.1 (0.02)
Chile	62 (0.9)	423 (2.8)	30 (0.8)	410 (3.2)	9 (0.5)	394 (4.9)	9.9 (0.03)
Hungary	61 (1.2)	508 (3.8)	31 (0.9)	505 (4.3)	8 (0.5)	487 (6.1)	10.0 (0.05)
Saudi Arabia	60 (1.2)	400 (5.1)	30 (1.0)	393 (4.9)	10 (0.6)	372 (6.5)	10.1 (0.06)
Slovenia	59 (1.0)	504 (2.5)	32 (1.0)	509 (2.9)	8 (0.5)	499 (5.1)	9.9 (0.04)
Australia	58 (1.1)	511 (5.3)	31 (1.0)	504 (5.3)	11 (0.7)	480 (7.3)	9.9 (0.05)
Tunisia	58 (1.0)	426 (2.7)	31 (0.7)	426 (3.2)	11 (0.7)	419 (5.2)	9.9 (0.04)
Iran, Islamic Rep. of	56 (1.1)	420 (4.8)	33 (0.8)	415 (4.8)	12 (0.6)	395 (5.8)	9.9 (0.05)
New Zealand	55 (0.9)	495 (5.3)	33 (0.7)	489 (5.9)	12 (0.5)	471 (6.3)	9.8 (0.04)
Bahrain	55 (1.1)	422 (2.7)	29 (1.0)	411 (3.1)	16 (0.6)	370 (5.6)	9.8 (0.04)
Syrian Arab Republic	54 (1.4)	392 (5.0)	31 (1.0)	375 (4.6)	14 (0.8)	361 (5.9)	9.8 (0.06)
Hong Kong SAR	54 (1.3)	585 (4.2)	36 (1.0)	589 (3.8)	10 (0.7)	582 (8.4)	9.7 (0.05)
Lebanon	53 (1.9)	464 (4.4)	30 (1.1)	444 (4.7)	17 (1.3)	418 (3.6)	9.7 (0.08)
Romania	53 (1.2)	476 (4.6)	34 (0.9)	457 (4.2)	13 (0.7)	411 (5.8)	9.7 (0.05)
Turkey	52 (1.1)	466 (4.7)	33 (0.8)	454 (4.2)	15 (0.7)	413 (5.5)	9.7 (0.05)
Singapore	52 (0.8)	618 (3.9)	36 (0.6)	609 (4.0)	12 (0.5)	589 (5.4)	9.7 (0.03)
United Arab Emirates	51 (0.9)	468 (2.2)	33 (0.6)	456 (2.4)	16 (0.5)	420 (3.3)	9.6 (0.04)
Qatar	51 (1.6)	426 (4.5)	31 (1.2)	409 (5.2)	18 (0.8)	374 (6.1)	9.6 (0.06)
Malaysia	49 (1.2)	444 (5.2)	39 (0.9)	442 (5.8)	12 (0.8)	418 (9.3)	9.6 (0.05)
Morocco	49 (1.1)	375 (2.3)	36 (0.8)	377 (2.5)	15 (0.7)	359 (3.6)	9.6 (0.04)
Jordan	48 (1.2)	426 (3.4)	33 (1.0)	412 (4.2)	19 (0.7)	362 (5.7)	9.5 (0.05)
Palestinian Nat'l Auth.	46 (1.2)	426 (3.2)	38 (0.9)	399 (4.0)	16 (0.8)	363 (7.0)	9.5 (0.05)
Indonesia	45 (1.4)	382 (4.1)	34 (0.9)	392 (5.0)	21 (0.9)	387 (6.7)	9.5 (0.07)
Oman	41 (0.9)	389 (3.0)	37 (0.7)	370 (3.4)	21 (0.7)	330 (4.2)	9.2 (0.03)
Thailand	30 (0.8)	426 (4.7)	43 (0.7)	431 (4.8)	27 (0.8)	424 (4.5)	8.8 (0.04)
Ghana	22 (1.0)	349 (6.0)	38 (1.0)	342 (4.6)	40 (1.2)	317 (4.7)	8.4 (0.05)
Israel	– –	– –	– –	– –	– –	– –	– –
International Avg.	59 (0.2)	473 (0.6)	29 (0.1)	467 (0.7)	12 (0.1)	441 (1.0)	

Centerpoint of scale set at 10.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A dash (–) indicates comparable data are not available.

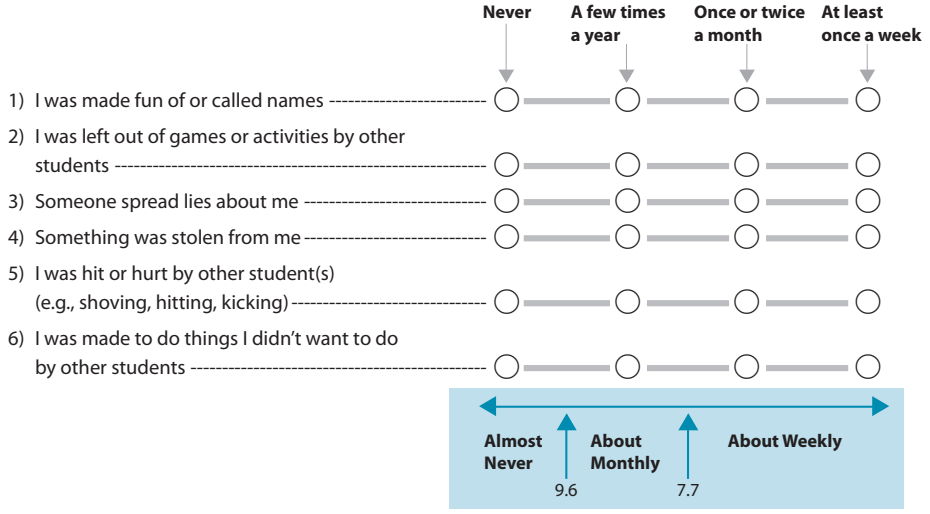
SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 6.12: Students Bullied at School (Continued)

Country	Almost Never		About Monthly		About Weekly		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Ninth Grade Participants							
Honduras	49 (1.1)	340 (4.5)	36 (0.9)	346 (4.3)	15 (0.6)	325 (4.8)	9.6 (0.04)
South Africa	25 (0.7)	393 (3.9)	42 (0.8)	362 (2.3)	33 (1.0)	322 (3.0)	8.5 (0.04)
Botswana	19 (0.7)	424 (3.6)	48 (0.7)	403 (2.7)	33 (0.7)	379 (3.2)	8.4 (0.02)
Benchmarking Participants							
Quebec, Canada	73 (0.9)	533 (2.4)	22 (0.7)	531 (3.0)	5 (0.4)	521 (5.9)	10.5 (0.04)
Massachusetts, US	71 (1.0)	563 (5.7)	23 (1.0)	562 (6.1)	6 (0.6)	533 (7.1)	10.5 (0.05)
California, US	67 (1.7)	496 (5.2)	24 (1.3)	493 (5.6)	9 (0.6)	477 (7.3)	10.3 (0.07)
Florida, US	64 (1.5)	517 (6.7)	27 (1.4)	519 (7.3)	9 (0.9)	488 (8.8)	10.1 (0.07)
North Carolina, US	64 (1.0)	540 (6.6)	28 (1.0)	537 (6.7)	8 (0.8)	515 (17.6)	10.1 (0.06)
Connecticut, US	63 (1.4)	520 (4.9)	28 (1.0)	523 (5.9)	9 (0.8)	511 (8.2)	10.1 (0.06)
Minnesota, US	61 (1.6)	550 (5.2)	30 (1.4)	539 (5.2)	9 (0.7)	532 (5.2)	10.0 (0.06)
Indiana, US	59 (1.5)	523 (5.4)	30 (1.3)	523 (5.5)	11 (0.9)	517 (7.2)	9.9 (0.07)
Colorado, US	58 (1.8)	520 (5.1)	31 (1.5)	519 (5.9)	11 (1.0)	506 (8.0)	9.9 (0.07)
Ontario, Canada	58 (1.2)	515 (3.1)	31 (0.9)	508 (3.4)	12 (0.8)	496 (3.4)	9.9 (0.05)
Alabama, US	57 (1.9)	469 (6.7)	32 (1.5)	467 (5.9)	11 (0.8)	455 (7.8)	9.9 (0.07)
Dubai, UAE	54 (2.1)	491 (2.7)	32 (1.3)	475 (4.1)	14 (1.1)	439 (5.2)	9.7 (0.09)
Alberta, Canada	52 (1.1)	511 (3.0)	35 (0.8)	505 (2.7)	14 (0.8)	485 (3.3)	9.6 (0.05)
Abu Dhabi, UAE	50 (1.4)	456 (4.2)	33 (0.9)	455 (3.8)	17 (1.0)	418 (5.6)	9.6 (0.06)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

During this year, how often have any of the following things happened to you at school?





Chapter 7

Teacher Preparation

Higher mathematics achievement was related to teachers' having more teaching experience, being confident in their mathematics teaching, and being satisfied with their careers.

The majority of fourth grade students had teachers with a bachelor's degree, and even more eighth grade students had teachers with bachelor's and postgraduate degrees. At both grades, most students had teachers that reported having at least ten years of teaching experience, being very well prepared to teach the TIMSS mathematics topics, and feeling very confident in teaching mathematics.

In view of the importance of a well prepared teaching force to an effective education system, TIMSS 2011 collected a range of information about teacher education. In the *TIMSS 2011 Encyclopedia*, each country chapter describes the educational route to teacher certification, including any additional requirements such as passing an examination or completing an induction year. Each chapter also addresses the requirements and practices for ongoing teacher professional development. Chapter 7 provides information about teachers' education, experience, professional development, and satisfaction with their teaching careers.

Mathematics Teachers' Formal Education

There is growing evidence that teacher preparation is a powerful predictor of students' achievement, perhaps even overcoming socioeconomic and language background factors (Darling-Hammond, 2000).

Exhibits 7.1 and 7.2 present teachers' reports about their highest level of formal education for the TIMSS 2011 fourth and eighth grade assessments, respectively. On average, internationally, across the fourth grade countries, 22 percent of the students had mathematics teachers with a postgraduate university degree, 57 percent had teachers with a bachelor's degree, 15 percent had teachers who had completed post-secondary education (usually a 3-year teacher education program), and 6 percent had teachers with an upper secondary degree. However, it is clear from examining the country-by-country results across the fourth grade, sixth grade, and benchmarking participants that different countries have different educational paths for becoming a primary level teacher. Similar results are shown in Exhibit 7.2 for the eighth grade students, although more students than at the fourth grade had teachers with bachelor's (63% vs. 57%) and postgraduate university degrees (24% vs. 22%).

Teachers Majoring in Education and Mathematics

In addition to the importance of a college or university degree or advanced degree, the literature reports widespread agreement that teachers should have solid mastery of the content in the subject to be taught. For example, a meta-analysis of studies in the United States examining various teacher characteristics and student achievement found that, at least in high school, students learn more mathematics when their mathematics teachers have additional degrees or coursework in mathematics (Wayne & Youngs, 2003).

Exhibit 7.3 shows the percentages of students in the TIMSS 2011 fourth grade assessment whose teachers had a major or specialization in primary education and if they also had a major or specialization in mathematics. Similar to the situation with formal education, there was a great deal of variation across countries in the degree of specialization by primary school teachers in mathematics education. On average across the fourth grade countries, 28 percent of the students were taught mathematics by a teacher with a major in both primary education and mathematics, and almost half (46%) by a teacher with a major in primary education but not in mathematics. Just 10 percent of fourth grade students, on average, were taught mathematics by a teacher with a major in mathematics but not in primary education, and another 10 percent by a teacher with some other major. In several countries, one-third or more of the fourth grade and sixth grade students had mathematics teachers without university degrees (Italy, Honduras, Morocco, Romania, Tunisia, and Yemen). However, as explained in the *TIMSS 2011 Encyclopedia*, countries have been implementing new policies that increase their teacher education requirements.

Mathematics achievement was highest, on average, among students taught by teachers with a primary education major but not a mathematics major (501), followed by students taught by a teacher with both majors (490) and students taught by a teacher with some other major (486). Among the fourth grade students whose teachers had college degrees, average achievement was lowest among students taught by a teacher with a major in mathematics but not in primary education (457).

As shown in Exhibit 7.4, the situation for mathematics teachers of eighth grade students was somewhat different. The majority of eighth grade students were taught mathematics by teachers who had a major in mathematics but not in mathematics education (41%), or who had a major in both (32%). Average mathematics achievement was only slightly different for these students (468 and 471, respectively) than for the 12 percent of students taught by teachers majoring in mathematics education but not mathematics (470), though higher than the 12 percent taught by teachers with other majors (462). Almost all of the eighth grade students were taught mathematics by teachers with college degrees (except in Morocco).

Exhibit 7.1: Mathematics Teachers' Formal Education*

TIMSS 2011 4th Grade Mathematics

Reported by Teachers

Country	Percent of Students by Teacher Educational Level			
	Completed Postgraduate University Degree**	Completed Bachelor's Degree or Equivalent but Not a Postgraduate Degree	Completed Post-secondary Education but Not a Bachelor's Degree	No Further than Upper-secondary Education
Armenia	79 (3.3)	3 (1.3)	18 (2.9)	1 (0.8)
Australia r	65 (3.2)	29 (3.1)	5 (1.7)	1 (0.8)
Austria	5 (1.6)	2 (0.9)	92 (1.9)	0 (0.3)
Azerbaijan	8 (1.9)	55 (3.8)	35 (3.6)	2 (0.8)
Bahrain	19 (3.2)	80 (3.3)	1 (0.7)	0 (0.0)
Belgium (Flemish)	0 (0.0)	99 (0.6)	0 (0.0)	1 (0.6)
Chile	9 (2.5)	81 (3.6)	10 (2.6)	0 (0.0)
Chinese Taipei	26 (3.7)	72 (3.7)	2 (1.1)	0 (0.0)
Croatia	1 (0.6)	30 (3.3)	69 (3.2)	1 (0.4)
Czech Republic	93 (2.2)	1 (0.5)	4 (1.7)	3 (1.4)
Denmark	3 (1.2)	80 (3.0)	17 (2.9)	1 (0.8)
England	36 (4.0)	61 (4.0)	2 (0.9)	0 (0.0)
Finland	81 (2.7)	17 (2.5)	0 (0.0)	2 (0.9)
Georgia	74 (3.3)	22 (3.1)	4 (1.4)	0 (0.0)
Germany	3 (1.1)	80 (2.2)	10 (1.8)	7 (1.7)
Hong Kong SAR	21 (3.9)	72 (4.2)	7 (2.3)	0 (0.0)
Hungary	3 (0.8)	97 (1.2)	1 (0.0)	0 (0.0)
Iran, Islamic Rep. of	1 (0.8)	37 (3.4)	49 (3.4)	13 (2.2)
Ireland	18 (2.6)	79 (2.8)	3 (1.0)	0 (0.0)
Italy	6 (1.6)	16 (2.4)	1 (0.3)	77 (2.9)
Japan	5 (1.7)	86 (2.8)	9 (2.2)	0 (0.0)
Kazakhstan	1 (0.7)	74 (3.7)	20 (3.1)	5 (1.9)
Korea, Rep. of	21 (3.2)	72 (3.8)	7 (1.9)	0 (0.0)
Kuwait	6 (1.9)	93 (2.1)	1 (0.8)	0 (0.0)
Lithuania	15 (2.4)	76 (2.7)	8 (1.8)	0 (0.0)
Malta	10 (0.1)	70 (0.1)	12 (0.1)	8 (0.1)
Morocco	1 (0.7)	33 (3.7)	0 (0.0)	67 (3.8)
Netherlands r	1 (0.7)	98 (1.1)	0 (0.0)	1 (0.9)
New Zealand	19 (2.5)	64 (2.7)	16 (2.2)	0 (0.0)
Northern Ireland r	28 (4.1)	69 (4.3)	3 (1.5)	0 (0.0)
Norway	2 (1.0)	93 (2.0)	5 (1.7)	0 (0.0)
Oman	9 (1.1)	75 (2.3)	15 (2.2)	1 (0.4)
Poland	96 (1.4)	3 (1.2)	1 (0.7)	0 (0.0)
Portugal	3 (0.9)	91 (1.7)	6 (1.6)	0 (0.0)
Qatar	25 (3.7)	70 (3.5)	5 (1.2)	0 (0.0)
Romania	7 (2.1)	30 (3.5)	29 (4.0)	34 (3.5)
Russian Federation	79 (2.6)	0 (0.0)	21 (2.6)	0 (0.0)
Saudi Arabia	2 (0.9)	68 (3.5)	30 (3.5)	0 (0.0)
Serbia	2 (0.4)	62 (3.5)	33 (3.5)	3 (1.2)
Singapore	9 (1.5)	62 (2.7)	28 (2.5)	1 (0.5)
Slovak Republic	99 (0.4)	0 (0.2)	0 (0.3)	0 (0.0)
Slovenia	1 (0.5)	58 (3.9)	42 (3.9)	0 (0.0)
Spain	1 (0.7)	99 (0.7)	0 (0.0)	0 (0.0)
Sweden	– –	– –	– –	– –
Thailand	11 (2.9)	86 (3.0)	1 (0.7)	1 (1.0)
Tunisia	0 (0.0)	13 (3.0)	43 (4.3)	43 (4.5)
Turkey	4 (1.2)	81 (2.5)	15 (2.3)	0 (0.0)
United Arab Emirates	19 (2.1)	72 (2.3)	9 (1.2)	0 (0.1)
United States	63 (2.4)	37 (2.4)	0 (0.0)	0 (0.0)
Yemen	0 (0.0)	34 (4.5)	31 (4.3)	35 (4.2)
International Avg.	22 (0.3)	57 (0.4)	15 (0.3)	6 (0.2)

* Based on countries' categorizations according to UNESCO's International Standard Classification of Education (Operational Manual for ISCED-1997).

** For example, doctorate, master's, or other postgraduate degree or diploma.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A dash (–) indicates comparable data not available.

An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 7.1: Mathematics Teachers' Formal Education* (Continued)

Country		Percent of Students by Teacher Educational Level			
		Completed Postgraduate University Degree**	Completed Bachelor's Degree or Equivalent but Not a Postgraduate Degree	Completed Post-secondary Education but Not a Bachelor's Degree	No Further than Upper-secondary Education
Sixth Grade Participants					
Botswana		2 (1.3)	14 (3.1)	82 (3.4)	2 (1.4)
Honduras		0 (0.0)	45 (3.7)	21 (3.7)	34 (4.1)
Yemen		1 (0.9)	34 (4.1)	38 (4.6)	27 (3.7)
Benchmarking Participants					
Alberta, Canada	r	13 (2.7)	87 (2.7)	0 (0.0)	0 (0.0)
Ontario, Canada		16 (2.7)	83 (2.6)	0 (0.0)	0 (0.0)
Quebec, Canada		14 (3.3)	85 (3.3)	0 (0.1)	0 (0.0)
Abu Dhabi, UAE		16 (3.1)	74 (3.7)	10 (2.3)	0 (0.0)
Dubai, UAE	r	29 (4.4)	63 (4.3)	7 (1.6)	1 (0.5)
Florida, US	r	44 (5.0)	55 (5.1)	1 (0.0)	0 (0.0)
North Carolina, US		45 (5.6)	55 (5.6)	0 (0.0)	0 (0.0)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 7.2: Mathematics Teachers' Formal Education*

TIMSS 2011 Mathematics 8th Grade

Reported by Teachers

Country	Percent of Students by Teacher Educational Level			
	Completed Postgraduate University Degree**	Completed Bachelor's Degree or Equivalent but Not a Postgraduate Degree	Completed Post-secondary Education but Not a Bachelor's Degree	No Further than Upper-secondary Education
Armenia	97 (1.2)	3 (1.2)	0 (0.0)	0 (0.0)
Australia r	64 (3.6)	36 (3.6)	0 (0.2)	0 (0.0)
Bahrain	23 (2.9)	74 (3.0)	2 (0.6)	2 (1.0)
Chile	6 (1.8)	86 (2.8)	7 (2.1)	0 (0.0)
Chinese Taipei	38 (3.9)	62 (3.9)	0 (0.0)	0 (0.0)
England	38 (4.6)	57 (4.8)	5 (1.6)	0 (0.0)
Finland	78 (3.1)	19 (2.7)	0 (0.1)	4 (1.7)
Georgia	85 (3.1)	14 (3.0)	1 (0.6)	0 (0.0)
Ghana	1 (0.0)	19 (3.1)	67 (3.9)	12 (2.4)
Hong Kong SAR	33 (4.4)	62 (4.3)	5 (1.7)	0 (0.0)
Hungary	20 (2.3)	80 (2.2)	1 (0.6)	0 (0.0)
Indonesia	6 (1.6)	87 (3.1)	6 (2.1)	2 (1.6)
Iran, Islamic Rep. of	2 (1.0)	60 (3.5)	36 (3.4)	2 (0.8)
Israel	34 (2.4)	62 (2.5)	3 (0.9)	0 (0.0)
Italy	25 (3.1)	74 (3.1)	0 (0.5)	0 (0.0)
Japan	9 (2.3)	91 (2.4)	1 (0.7)	0 (0.0)
Jordan	12 (2.7)	75 (3.5)	12 (2.5)	1 (0.9)
Kazakhstan	1 (0.5)	98 (1.1)	1 (0.0)	0 (0.0)
Korea, Rep. of	37 (3.0)	63 (3.0)	0 (0.0)	0 (0.0)
Lebanon	4 (1.4)	72 (3.7)	18 (3.4)	7 (2.2)
Lithuania	31 (3.1)	62 (3.2)	7 (1.9)	0 (0.0)
Macedonia, Rep. of r	1 (0.6)	33 (4.0)	65 (3.9)	2 (1.2)
Malaysia	4 (1.5)	86 (2.7)	8 (2.2)	2 (1.0)
Morocco	1 (0.6)	19 (2.3)	0 (0.0)	80 (2.3)
New Zealand	35 (3.2)	55 (3.5)	10 (2.0)	0 (0.0)
Norway	1 (1.0)	98 (1.5)	1 (1.1)	0 (0.0)
Oman	5 (0.4)	95 (0.5)	0 (0.1)	0 (0.3)
Palestinian Nat'l Auth.	4 (1.5)	85 (3.0)	11 (2.6)	0 (0.0)
Qatar	29 (4.3)	68 (4.4)	2 (0.6)	0 (0.0)
Romania	20 (3.1)	53 (3.7)	26 (2.8)	0 (0.3)
Russian Federation	99 (0.6)	0 (0.0)	1 (0.6)	0 (0.0)
Saudi Arabia	1 (1.0)	95 (1.9)	4 (1.6)	0 (0.0)
Singapore	10 (1.8)	87 (1.9)	2 (0.8)	0 (0.0)
Slovenia	1 (0.5)	53 (2.6)	45 (2.7)	1 (0.3)
Sweden	– –	– –	– –	– –
Syrian Arab Republic	13 (3.1)	45 (4.6)	41 (4.0)	1 (0.8)
Thailand	16 (2.9)	79 (3.2)	1 (1.0)	3 (1.4)
Tunisia	1 (0.0)	73 (3.5)	25 (3.3)	1 (0.0)
Turkey	8 (1.9)	80 (2.5)	12 (2.1)	0 (0.0)
Ukraine	2 (1.1)	98 (1.2)	0 (0.0)	0 (0.0)
United Arab Emirates	26 (1.9)	70 (2.0)	4 (0.8)	0 (0.0)
United States r	62 (2.6)	38 (2.7)	0 (0.0)	0 (0.0)
International Avg.	24 (0.4)	63 (0.5)	11 (0.3)	3 (0.1)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

* Based on countries' categorizations according to UNESCO's International Standard Classification of Education (Operational Manual for ISCED-1997).

** For example, doctorate, master's, or other postgraduate degree or diploma.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A dash (–) indicates comparable data not available.

An "r" indicates data are available for at least 70% but less than 85% of the students.

Exhibit 7.2: Mathematics Teachers' Formal Education* (Continued)

Country		Percent of Students by Teacher Educational Level			
		Completed Postgraduate University Degree**	Completed Bachelor's Degree or Equivalent but Not a Postgraduate Degree	Completed Post-secondary Education but Not a Bachelor's Degree	No Further than Upper-secondary Education
Ninth Grade Participants					
Botswana		1 (0.5)	12 (2.8)	88 (2.9)	0 (0.0)
Honduras	r	3 (1.5)	76 (3.9)	12 (3.1)	9 (2.6)
South Africa		18 (3.0)	42 (3.4)	38 (3.8)	2 (1.0)
Benchmarking Participants					
Alberta, Canada		10 (2.0)	90 (2.0)	0 (0.0)	0 (0.0)
Ontario, Canada		17 (3.6)	81 (3.6)	0 (0.0)	1 (0.7)
Quebec, Canada		12 (2.6)	85 (3.0)	2 (1.2)	1 (1.0)
Abu Dhabi, UAE		21 (3.2)	74 (3.5)	5 (1.4)	0 (0.0)
Dubai, UAE		36 (3.9)	58 (4.1)	5 (2.0)	0 (0.0)
Alabama, US	r	51 (7.2)	49 (7.2)	0 (0.0)	0 (0.0)
California, US	r	85 (4.5)	15 (4.5)	0 (0.0)	0 (0.0)
Colorado, US	r	70 (5.5)	30 (5.5)	0 (0.0)	0 (0.0)
Connecticut, US		84 (5.1)	16 (5.1)	0 (0.0)	0 (0.0)
Florida, US	r	42 (7.0)	57 (7.0)	0 (0.0)	2 (0.2)
Indiana, US	r	57 (7.0)	43 (7.0)	0 (0.0)	0 (0.0)
Massachusetts, US		71 (5.0)	29 (5.0)	0 (0.0)	0 (0.0)
Minnesota, US		72 (6.4)	28 (6.4)	0 (0.0)	0 (0.0)
North Carolina, US	r	42 (6.6)	58 (6.6)	0 (0.0)	0 (0.0)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 7.3: Teachers Majored in Education and Mathematics

TIMSS 2011 4th Grade Mathematics

Reported by Teachers

Country	Major in Primary Education and Major (or Specialization) in Mathematics		Major in Primary Education but No Major (or Specialization) in Mathematics		Major in Mathematics but No Major in Primary Education		All Other Majors		No Formal Education Beyond Upper-secondary*	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Armenia	54 (3.9)	455 (5.2)	22 (3.5)	450 (7.8)	19 (3.4)	457 (8.5)	5 (1.7)	462 (13.2)	1 (0.8)	~ ~
Australia r	14 (2.8)	517 (13.2)	81 (3.2)	521 (3.8)	1 (0.8)	~ ~	4 (1.1)	463 (8.6)	1 (0.8)	~ ~
Austria	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –
Azerbaijan	65 (3.5)	469 (7.7)	19 (3.2)	463 (13.5)	11 (2.7)	429 (16.1)	3 (1.3)	463 (20.5)	2 (0.9)	~ ~
Bahrain	31 (5.5)	434 (7.0)	1 (0.7)	~ ~	63 (5.4)	429 (4.8)	5 (1.1)	538 (22.3)	0 (0.0)	~ ~
Belgium (Flemish)	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –
Chile	36 (4.2)	471 (5.6)	61 (4.1)	456 (3.8)	1 (0.9)	~ ~	2 (1.0)	~ ~	0 (0.0)	~ ~
Chinese Taipei	32 (3.5)	598 (3.6)	39 (3.9)	594 (3.1)	4 (1.6)	576 (7.9)	25 (3.6)	582 (5.1)	0 (0.0)	~ ~
Croatia	17 (2.8)	481 (5.0)	81 (2.9)	491 (2.4)	0 (0.0)	~ ~	1 (0.6)	~ ~	1 (0.4)	~ ~
Czech Republic	4 (1.7)	523 (14.3)	77 (3.3)	513 (2.4)	3 (1.3)	504 (17.4)	13 (2.6)	497 (9.3)	3 (1.4)	496 (17.5)
Denmark	29 (3.4)	538 (4.5)	16 (2.4)	542 (4.4)	30 (3.3)	540 (5.0)	25 (3.0)	538 (4.8)	1 (0.8)	~ ~
England	17 (3.1)	539 (8.5)	65 (4.1)	546 (5.4)	2 (0.5)	~ ~	17 (3.2)	538 (7.8)	0 (0.0)	~ ~
Finland	13 (2.4)	554 (4.9)	80 (2.7)	544 (2.9)	0 (0.0)	~ ~	5 (1.1)	555 (9.7)	2 (0.9)	~ ~
Georgia	57 (3.7)	452 (4.7)	17 (2.5)	436 (11.5)	19 (3.5)	453 (11.1)	8 (1.8)	457 (9.4)	0 (0.0)	~ ~
Germany	49 (3.4)	534 (2.9)	36 (3.7)	526 (3.6)	2 (1.0)	~ ~	7 (1.8)	507 (12.0)	6 (1.7)	534 (9.0)
Hong Kong SAR	54 (4.2)	604 (5.2)	27 (3.4)	606 (5.1)	12 (3.0)	605 (10.2)	7 (2.2)	568 (25.4)	0 (0.0)	~ ~
Hungary	2 (1.1)	~ ~	94 (1.1)	516 (3.8)	3 (0.9)	479 (21.5)	1 (0.8)	~ ~	0 (0.0)	~ ~
Iran, Islamic Rep. of	21 (2.9)	451 (9.7)	48 (3.5)	426 (4.8)	3 (1.3)	465 (27.1)	15 (2.7)	410 (7.7)	12 (2.2)	437 (10.8)
Ireland	14 (2.7)	534 (5.7)	78 (2.8)	526 (3.0)	0 (0.0)	~ ~	8 (1.6)	535 (9.8)	0 (0.0)	~ ~
Italy	3 (1.3)	528 (25.0)	1 (0.5)	~ ~	1 (0.8)	~ ~	18 (3.0)	511 (4.6)	77 (3.1)	508 (3.1)
Japan	18 (2.6)	586 (4.1)	61 (3.6)	585 (2.1)	1 (0.7)	~ ~	20 (3.1)	586 (4.8)	0 (0.0)	~ ~
Kazakhstan	63 (3.7)	505 (6.0)	29 (3.8)	498 (9.9)	1 (0.9)	~ ~	1 (0.9)	~ ~	5 (1.9)	474 (13.4)
Korea, Rep. of	10 (2.5)	617 (8.1)	86 (2.7)	603 (2.1)	0 (0.0)	~ ~	4 (1.7)	616 (17.5)	0 (0.0)	~ ~
Kuwait	67 (4.2)	342 (4.6)	2 (1.1)	~ ~	31 (4.2)	336 (8.5)	0 (0.0)	~ ~	0 (0.0)	~ ~
Lithuania	9 (2.0)	521 (7.9)	88 (2.2)	535 (2.7)	0 (0.0)	~ ~	2 (0.9)	~ ~	0 (0.0)	~ ~
Malta	14 (0.1)	498 (3.0)	56 (0.1)	492 (1.5)	0 (0.0)	~ ~	21 (0.1)	497 (3.5)	8 (0.1)	511 (4.9)
Morocco	5 (2.2)	340 (34.4)	2 (1.1)	~ ~	4 (1.4)	383 (35.5)	22 (3.0)	335 (9.4)	67 (3.9)	334 (5.8)
Netherlands r	24 (3.4)	538 (5.4)	75 (3.4)	538 (2.3)	0 (0.0)	~ ~	0 (0.0)	~ ~	1 (0.9)	~ ~
New Zealand	15 (2.1)	480 (8.7)	76 (2.6)	488 (3.1)	0 (0.1)	~ ~	9 (1.5)	486 (7.7)	0 (0.0)	~ ~
Northern Ireland r	10 (3.1)	564 (12.2)	76 (4.2)	567 (3.9)	1 (0.0)	~ ~	13 (3.1)	537 (16.4)	0 (0.0)	~ ~
Norway	24 (3.7)	494 (4.9)	62 (4.1)	493 (3.5)	6 (2.4)	516 (15.0)	8 (1.5)	498 (6.0)	0 (0.0)	~ ~
Oman	58 (2.9)	384 (4.0)	8 (1.6)	403 (9.7)	24 (2.8)	389 (6.5)	9 (2.1)	378 (9.8)	1 (0.5)	~ ~
Poland	19 (3.0)	484 (6.6)	81 (3.0)	480 (2.3)	0 (0.0)	~ ~	0 (0.0)	~ ~	0 (0.0)	~ ~
Portugal	25 (3.5)	523 (8.2)	71 (3.7)	535 (3.9)	0 (0.0)	~ ~	4 (1.4)	539 (7.6)	0 (0.0)	~ ~
Qatar	22 (3.3)	411 (11.6)	6 (2.0)	535 (13.6)	49 (4.0)	402 (5.9)	23 (2.9)	406 (13.3)	0 (0.0)	~ ~
Romania	21 (3.4)	470 (14.4)	27 (3.6)	488 (8.4)	1 (0.7)	~ ~	16 (2.3)	499 (10.5)	35 (3.5)	478 (8.1)
Russian Federation	59 (3.5)	542 (4.8)	38 (3.5)	542 (5.2)	1 (0.9)	~ ~	1 (0.8)	~ ~	0 (0.0)	~ ~
Saudi Arabia	46 (4.2)	407 (9.5)	8 (2.5)	436 (11.3)	34 (4.4)	411 (6.9)	12 (2.5)	404 (16.8)	0 (0.0)	~ ~
Serbia	29 (3.4)	524 (5.5)	67 (3.5)	513 (3.9)	2 (1.0)	~ ~	0 (0.0)	~ ~	3 (1.2)	505 (11.8)
Singapore	54 (2.8)	606 (4.6)	14 (1.8)	606 (9.3)	11 (1.6)	615 (10.5)	20 (2.6)	599 (7.5)	1 (0.5)	~ ~
Slovak Republic	10 (2.1)	512 (6.4)	84 (2.3)	507 (4.3)	3 (1.4)	487 (14.5)	2 (1.0)	~ ~	0 (0.0)	~ ~
Slovenia	4 (1.3)	518 (6.9)	96 (1.3)	513 (2.2)	0 (0.0)	~ ~	0 (0.0)	~ ~	0 (0.0)	~ ~
Spain	27 (3.7)	482 (6.2)	57 (3.9)	482 (3.4)	5 (1.8)	500 (12.3)	11 (2.4)	473 (9.1)	0 (0.0)	~ ~
Sweden r	62 (4.0)	502 (2.9)	28 (3.6)	508 (3.8)	5 (1.6)	526 (11.1)	3 (1.5)	512 (15.9)	2 (1.1)	~ ~
Thailand	29 (4.3)	465 (8.9)	13 (2.5)	446 (15.8)	37 (4.4)	462 (6.7)	19 (3.7)	453 (10.9)	1 (1.0)	~ ~
Tunisia	16 (3.2)	348 (8.3)	8 (2.3)	324 (10.3)	11 (2.8)	344 (11.0)	21 (3.3)	359 (10.8)	44 (4.5)	373 (5.6)
Turkey	19 (2.6)	472 (9.5)	58 (3.2)	476 (6.1)	3 (1.4)	438 (33.2)	20 (2.3)	451 (15.2)	0 (0.0)	~ ~
United Arab Emirates	28 (2.4)	430 (4.9)	8 (1.2)	504 (8.0)	53 (2.6)	421 (3.5)	11 (1.3)	465 (6.5)	0 (0.1)	~ ~
United States	10 (1.6)	549 (5.8)	74 (2.3)	543 (2.3)	1 (0.6)	~ ~	14 (1.6)	537 (6.7)	0 (0.0)	~ ~
Yemen	15 (2.9)	257 (14.3)	11 (2.2)	258 (15.2)	23 (3.9)	248 (13.1)	15 (3.3)	257 (13.2)	36 (4.4)	239 (11.1)
International Avg.	28 (0.5)	490 (1.4)	46 (0.4)	501 (1.0)	10 (0.3)	457 (3.1)	10 (0.3)	486 (2.0)	6 (0.2)	444 (3.0)

* Countries have been increasing their certification requirements and providing professional development to teachers certified under earlier guidelines.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A dash (–) indicates comparable data not available. A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 7.3: Teachers Majored in Education and Mathematics (Continued)

TIMSS 2011 Mathematics 4th Grade

Country		Major in Primary Education and Major (or Specialization) in Mathematics		Major in Primary Education but No Major (or Specialization) in Mathematics		Major in Mathematics but No Major in Primary Education		All Other Majors		No Formal Education Beyond Upper-secondary*	
		Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Sixth Grade Participants											
Botswana		32 (3.7)	419 (7.9)	43 (4.3)	423 (8.4)	10 (2.8)	408 (8.5)	12 (2.7)	421 (6.2)	2 (1.4)	~ ~
Honduras		11 (3.4)	427 (24.9)	27 (3.9)	397 (6.9)	4 (1.5)	395 (20.1)	26 (4.0)	396 (11.4)	33 (4.0)	394 (8.2)
Yemen		20 (3.6)	355 (11.0)	9 (2.3)	338 (27.8)	33 (4.0)	350 (8.6)	11 (2.5)	359 (17.2)	27 (3.7)	340 (11.0)
Benchmarking Participants											
Alberta, Canada	r	7 (2.0)	507 (9.8)	82 (3.4)	506 (3.2)	3 (1.7)	516 (6.7)	8 (2.2)	503 (4.1)	0 (0.0)	~ ~
Ontario, Canada		6 (1.7)	535 (8.5)	70 (3.3)	519 (3.8)	1 (0.0)	~ ~	22 (3.1)	513 (5.9)	0 (0.0)	~ ~
Quebec, Canada		11 (2.7)	528 (5.0)	80 (3.3)	534 (2.9)	1 (0.4)	~ ~	8 (2.2)	522 (5.5)	0 (0.0)	~ ~
Abu Dhabi, UAE		34 (4.3)	411 (8.3)	6 (2.1)	459 (19.3)	54 (4.4)	411 (7.2)	6 (2.0)	453 (12.6)	0 (0.0)	~ ~
Dubai, UAE	r	26 (2.0)	470 (5.2)	16 (1.7)	536 (7.1)	35 (2.2)	441 (6.9)	23 (2.6)	480 (5.0)	0 (0.5)	~ ~
Florida, US	r	10 (3.5)	543 (18.9)	66 (4.8)	546 (4.7)	2 (1.4)	~ ~	22 (3.9)	538 (6.8)	0 (0.0)	~ ~
North Carolina, US		12 (4.5)	539 (12.8)	82 (4.3)	553 (5.0)	0 (0.0)	~ ~	6 (2.5)	569 (17.5)	0 (0.0)	~ ~

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 7.4: Teachers Majored in Education and Mathematics

TIMSS 2011 8th Grade Mathematics

Reported by Teachers

Country	Major in Mathematics and Mathematics Education		Major in Mathematics Education but No Major in Mathematics		Major in Mathematics but No Major in Mathematics Education		All Other Majors		No Formal Education Beyond Upper-secondary*	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Armenia	55 (3.6)	459 (4.1)	1 (0.6)	~ ~	42 (3.7)	471 (5.2)	2 (0.7)	~ ~	0 (0.0)	~ ~
Australia r	37 (4.1)	505 (7.5)	9 (2.4)	522 (23.3)	21 (3.0)	519 (14.0)	34 (3.6)	500 (7.5)	0 (0.0)	~ ~
Bahrain	18 (1.8)	458 (8.8)	30 (3.1)	389 (4.8)	48 (3.5)	404 (3.5)	2 (0.1)	~ ~	2 (1.0)	~ ~
Chile	42 (4.1)	434 (6.5)	3 (1.3)	444 (18.1)	30 (3.7)	414 (5.6)	25 (3.4)	393 (6.4)	0 (0.0)	~ ~
Chinese Taipei	55 (3.7)	616 (3.5)	3 (1.3)	605 (47.2)	34 (3.8)	607 (8.0)	8 (2.1)	578 (13.0)	0 (0.0)	~ ~
England	41 (3.9)	502 (10.4)	5 (1.9)	470 (25.6)	35 (4.0)	517 (7.6)	18 (2.6)	503 (13.6)	0 (0.0)	~ ~
Finland	8 (1.9)	525 (7.1)	0 (0.0)	~ ~	63 (3.2)	519 (2.6)	26 (2.6)	498 (6.1)	4 (1.7)	512 (6.7)
Georgia	54 (3.7)	437 (5.2)	4 (1.4)	400 (16.0)	40 (3.6)	430 (7.4)	2 (1.1)	~ ~	0 (0.0)	~ ~
Ghana	33 (4.2)	319 (6.9)	13 (3.0)	346 (10.6)	17 (3.2)	322 (12.1)	25 (3.5)	333 (8.7)	12 (2.3)	352 (16.4)
Hong Kong SAR	46 (4.7)	574 (8.2)	13 (3.1)	613 (15.3)	17 (3.4)	585 (11.7)	24 (3.9)	591 (9.5)	0 (0.0)	~ ~
Hungary	14 (1.9)	530 (7.3)	63 (3.4)	500 (4.3)	22 (2.9)	502 (9.3)	2 (0.7)	~ ~	0 (0.0)	~ ~
Indonesia	23 (3.6)	393 (9.7)	18 (3.0)	398 (10.7)	48 (4.9)	378 (7.4)	10 (2.9)	387 (11.8)	2 (1.7)	~ ~
Iran, Islamic Rep. of	0 (0.0)	~ ~	51 (3.7)	411 (4.9)	36 (3.7)	421 (7.7)	12 (2.1)	417 (18.3)	2 (0.8)	~ ~
Israel	53 (3.2)	532 (6.5)	6 (1.4)	531 (15.9)	36 (3.1)	504 (7.9)	5 (1.2)	492 (17.1)	0 (0.0)	~ ~
Italy r	0 (0.0)	~ ~	0 (0.0)	~ ~	50 (4.0)	491 (4.2)	50 (4.0)	507 (3.2)	0 (0.0)	~ ~
Japan	46 (4.0)	577 (3.9)	7 (2.0)	556 (8.3)	35 (3.3)	567 (3.9)	12 (2.7)	557 (9.5)	0 (0.0)	~ ~
Jordan	9 (2.0)	424 (12.9)	9 (2.4)	407 (13.9)	80 (2.9)	404 (4.0)	2 (1.0)	~ ~	1 (0.9)	~ ~
Kazakhstan	45 (4.2)	489 (6.1)	2 (0.5)	~ ~	51 (4.3)	485 (6.5)	1 (0.0)	~ ~	0 (0.0)	~ ~
Korea, Rep. of	7 (1.4)	620 (10.6)	49 (2.9)	610 (4.7)	42 (2.7)	613 (4.6)	2 (0.9)	~ ~	0 (0.0)	~ ~
Lebanon	43 (4.2)	448 (6.5)	2 (1.3)	~ ~	37 (4.5)	452 (5.5)	11 (2.7)	454 (12.9)	7 (2.2)	439 (12.0)
Lithuania	36 (3.4)	506 (5.4)	10 (1.8)	501 (6.5)	50 (3.8)	503 (4.1)	4 (1.6)	469 (12.1)	0 (0.0)	~ ~
Macedonia, Rep. of r	19 (3.5)	429 (13.5)	7 (2.2)	443 (12.1)	64 (4.2)	422 (7.6)	8 (2.3)	401 (15.2)	2 (1.2)	~ ~
Malaysia	31 (3.9)	432 (9.9)	10 (2.3)	419 (13.6)	36 (3.6)	453 (8.3)	20 (3.5)	444 (13.2)	2 (1.1)	~ ~
Morocco	5 (1.4)	373 (13.4)	0 (0.0)	~ ~	12 (2.1)	360 (6.9)	3 (1.0)	365 (19.9)	80 (2.4)	373 (2.5)
New Zealand	29 (2.8)	505 (11.0)	5 (1.6)	492 (28.7)	37 (3.4)	490 (6.0)	30 (3.1)	471 (9.9)	0 (0.0)	~ ~
Norway	11 (2.8)	474 (4.6)	1 (0.7)	~ ~	39 (4.3)	482 (3.2)	50 (4.6)	471 (3.6)	0 (0.0)	~ ~
Oman	48 (3.2)	363 (4.5)	12 (2.3)	366 (9.7)	39 (3.4)	370 (4.7)	1 (0.6)	~ ~	0 (0.3)	~ ~
Palestinian Nat'l Auth.	17 (3.0)	399 (9.9)	24 (2.9)	394 (7.2)	52 (3.5)	409 (5.2)	7 (1.9)	421 (9.7)	0 (0.0)	~ ~
Qatar	35 (4.2)	387 (10.2)	13 (2.4)	414 (20.6)	46 (4.8)	422 (9.1)	6 (1.7)	431 (21.6)	0 (0.0)	~ ~
Romania	73 (3.2)	451 (4.7)	0 (0.0)	~ ~	26 (3.1)	476 (8.0)	0 (0.0)	~ ~	0 (0.3)	~ ~
Russian Federation	63 (3.1)	543 (3.8)	0 (0.0)	~ ~	35 (3.1)	529 (6.1)	2 (0.9)	~ ~	0 (0.0)	~ ~
Saudi Arabia	31 (4.1)	399 (10.5)	38 (4.3)	397 (6.8)	30 (3.9)	394 (8.1)	2 (1.3)	~ ~	0 (0.0)	~ ~
Singapore	32 (2.1)	620 (5.8)	6 (1.2)	584 (16.2)	45 (2.4)	620 (5.5)	17 (2.0)	585 (10.2)	0 (0.0)	~ ~
Slovenia	33 (2.7)	507 (3.1)	16 (2.0)	508 (6.2)	48 (2.7)	503 (2.9)	3 (0.9)	470 (14.4)	1 (0.3)	~ ~
Sweden r	40 (3.6)	484 (3.6)	21 (3.0)	487 (5.3)	21 (3.0)	491 (4.1)	16 (2.7)	480 (6.7)	2 (0.9)	~ ~
Syrian Arab Republic	17 (3.4)	379 (12.1)	2 (1.2)	~ ~	71 (3.9)	380 (5.1)	8 (2.3)	361 (17.3)	1 (0.8)	~ ~
Thailand	18 (3.1)	417 (11.3)	0 (0.0)	~ ~	61 (4.0)	431 (6.5)	17 (3.1)	426 (10.9)	3 (1.5)	415 (27.7)
Tunisia	17 (2.9)	428 (7.9)	1 (0.7)	~ ~	78 (3.6)	422 (3.6)	3 (1.7)	433 (18.9)	1 (0.0)	~ ~
Turkey	55 (3.7)	449 (4.8)	23 (3.0)	449 (7.0)	18 (2.6)	471 (14.6)	4 (1.5)	442 (19.5)	0 (0.0)	~ ~
Ukraine	45 (4.2)	479 (5.9)	0 (0.0)	~ ~	54 (4.2)	478 (6.0)	1 (0.8)	~ ~	0 (0.0)	~ ~
United Arab Emirates	37 (2.2)	467 (3.5)	7 (1.4)	449 (11.6)	53 (2.4)	448 (3.4)	3 (0.6)	464 (13.9)	0 (0.0)	~ ~
United States r	28 (2.5)	524 (6.8)	25 (2.4)	510 (6.5)	15 (1.8)	497 (6.7)	31 (2.6)	510 (6.7)	0 (0.0)	~ ~
International Avg.	32 (0.5)	471 (1.3)	12 (0.3)	470 (3.0)	41 (0.5)	468 (1.1)	12 (0.4)	462 (2.4)	3 (0.1)	418 (7.0)

* Countries have been increasing their certification requirements and providing professional development to teachers certified under earlier guidelines.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 7.4: Teachers Majored in Education and Mathematics (Continued)

TIMSS 2011 Mathematics 8th Grade

Country	Major in Mathematics and Mathematics Education		Major in Mathematics Education but No Major in Mathematics		Major in Mathematics but No Major in Mathematics Education		All Other Majors		No Formal Education Beyond Upper-secondary*	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Ninth Grade Participants										
Botswana	27 (4.0)	396 (6.3)	10 (2.5)	391 (6.1)	58 (4.4)	399 (3.2)	4 (1.7)	397 (5.0)	0 (0.0)	~ ~
Honduras r	42 (4.5)	333 (4.5)	1 (0.8)	~ ~	39 (4.7)	347 (9.3)	9 (2.9)	334 (17.5)	9 (2.6)	333 (16.0)
South Africa	27 (3.3)	358 (7.4)	8 (2.2)	352 (18.1)	54 (3.9)	345 (4.8)	10 (2.1)	372 (13.1)	2 (1.0)	~ ~
Benchmarking Participants										
Alberta, Canada	29 (3.7)	505 (4.6)	10 (2.1)	504 (9.1)	6 (1.8)	481 (7.8)	55 (4.1)	507 (3.4)	0 (0.0)	~ ~
Ontario, Canada	4 (1.6)	520 (9.9)	6 (1.8)	516 (7.6)	8 (2.1)	516 (11.9)	81 (2.9)	512 (3.0)	1 (0.7)	~ ~
Quebec, Canada	27 (4.0)	539 (5.6)	20 (3.2)	531 (6.6)	20 (3.2)	542 (6.2)	32 (3.6)	524 (5.6)	1 (1.1)	~ ~
Abu Dhabi, UAE	32 (4.4)	455 (6.1)	9 (2.8)	451 (14.7)	57 (4.7)	448 (6.5)	2 (1.2)	~ ~	0 (0.0)	~ ~
Dubai, UAE	48 (2.2)	490 (4.1)	3 (1.0)	449 (6.6)	47 (2.3)	463 (4.0)	3 (0.7)	494 (16.4)	0 (0.0)	~ ~
Alabama, US r	43 (6.3)	463 (11.9)	36 (6.4)	470 (10.7)	12 (3.9)	485 (13.3)	8 (4.1)	461 (21.9)	0 (0.0)	~ ~
California, US r	25 (6.1)	507 (18.3)	18 (5.1)	521 (12.1)	15 (4.7)	463 (14.6)	42 (7.5)	485 (11.2)	0 (0.0)	~ ~
Colorado, US r	30 (5.7)	515 (12.9)	16 (4.2)	533 (13.0)	27 (6.1)	516 (13.1)	28 (6.0)	516 (16.7)	0 (0.0)	~ ~
Connecticut, US	29 (4.6)	512 (12.7)	19 (4.8)	513 (23.1)	23 (3.8)	514 (12.2)	30 (5.0)	539 (10.4)	0 (0.0)	~ ~
Florida, US r	11 (3.7)	531 (12.9)	23 (6.5)	530 (13.2)	10 (3.2)	542 (18.4)	54 (7.8)	506 (10.4)	2 (0.2)	~ ~
Indiana, US r	44 (7.0)	529 (7.4)	33 (5.8)	508 (11.1)	18 (5.6)	517 (12.7)	5 (3.2)	517 (27.8)	0 (0.0)	~ ~
Massachusetts, US	20 (4.7)	565 (19.4)	19 (5.5)	554 (14.2)	25 (5.8)	557 (10.8)	35 (6.5)	565 (9.3)	0 (0.0)	~ ~
Minnesota, US r	35 (6.4)	537 (8.3)	32 (6.5)	549 (8.5)	19 (4.9)	547 (12.9)	14 (5.5)	564 (19.2)	0 (0.0)	~ ~
North Carolina, US r	35 (5.2)	555 (12.5)	24 (5.9)	551 (20.0)	14 (4.3)	491 (10.7)	28 (4.3)	542 (11.0)	0 (0.0)	~ ~

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Teachers' Years of Experience

It is difficult to examine the effects of teacher experience on student achievement, because sometimes more experienced teachers are assigned to students of higher ability and fewer discipline problems, and other times the more experienced teachers are assigned to the lower-achieving students in need of more help. However, some research has addressed this selection bias problem; and experience can have a large positive impact primarily in the first few years of teaching, although the benefits can continue beyond the first five years of a teacher's career (Harris & Sass, 2011; Leigh, 2010).

Exhibit 7.5 presents teachers' reports about their years of experience for participants in the TIMSS fourth grade assessment. On average across the fourth grade countries, teachers of mathematics had been teaching for an average of 17 years. Forty-one percent of the students, on average, had very experienced teachers with 20 years or more of experience, and another 30 percent had teachers with at least 10 (but less than 20) years of experience. Taken together, close to three-fourths of the students had very experienced teachers.

Average mathematics achievement was highest, on average, for students whose teachers had 20 or more years of experience, compared to those whose teachers had between 10 and 20 years of experience or students with even less experienced teachers (498 and 490 vs. 486, respectively). This achievement gap could be a reflection of more senior teachers receiving preferred assignments, although at the fourth grade there is relatively little tracking or streaming. However, this gap also could reflect the fact that the newer teachers still are learning the most effective instructional approaches.

Exhibit 7.6 shows mathematics teachers' reports from the eighth grade assessment about their years of experience. On average, the eighth grade teachers were slightly less experienced than their fourth grade counterparts (16 years vs. 17 years), leading to lesser percentages of students taught by experienced teachers—64 percent taught by teachers with at least 10 years of experience, compared to 71 percent of fourth grade students. The relationship between teacher experience and average student achievement was more pronounced among the eighth grade students, rising from 458 points for students taught by teachers with less than 5 years of experience to 474 points for students taught by teachers with more than 20 years of experience. With more use of tracking and streaming of students by the eighth grade, this may be symptomatic of the more experienced teachers receiving preferred assignments.

Teachers' Professional Development

Evidence from recent meta-analyses of research conducted in the United States shows that teacher professional development in mathematics has a significant positive effect on student achievement (Blank & de las Alas, 2009) and that the amount of professional development (more than 14 hours) was an important factor (Yoon, Duncan, Lee, Scarloss, & Shapley, 2007).

Exhibit 7.7 presents, for the fourth grade TIMSS assessment, teachers' reports about areas of professional development in mathematics in which they had participated in the past two years. Although there was a lot of variation across countries, the most common areas of mathematics professional development for teachers of fourth grade students were mathematics pedagogy/instruction, mathematics content, and mathematics curriculum. On average, 46 percent of students had teachers who had professional development in mathematics instruction or pedagogy, 44 percent had teachers taking mathematics content, and 41 percent taking mathematics curriculum. Mathematics assessment and integrating information technology into mathematics were less common areas, with 37 percent and 33 percent of students, respectively, having teachers who had participated in professional development in these areas in the past two years.

As shown in Exhibit 7.8, mathematics teachers of students in the TIMSS eighth grade assessment reported somewhat higher levels of participation in mathematics professional development. On average across the eighth grade countries, the majority of students were taught by mathematics teachers who had participated in professional development in mathematics instruction or pedagogy (58%), content (55%), or curriculum (52%) in the past two years. Furthermore, almost half of the students had teachers with professional development in integrating information technology into mathematics (48%), mathematics assessment (47%), or improving students' critical thinking or problem solving skills (43%).

Exhibit 7.5: Teachers' Years of Experience

TIMSS 2011 4th Grade Mathematics

Reported by Teachers

Country	20 Years or More		At Least 10 but Less than 20 Years		At Least 5 but Less than 10 Years		Less than 5 Years		Average Years of Experience
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Armenia	73 (3.8)	453 (3.9)	21 (3.7)	455 (7.6)	3 (1.2)	444 (9.1)	3 (1.0)	433 (34.1)	26 (0.8)
Australia r	41 (3.8)	517 (6.0)	23 (3.4)	524 (6.6)	19 (2.8)	510 (10.0)	17 (3.1)	524 (9.4)	17 (0.9)
Austria	56 (3.4)	513 (2.9)	24 (3.2)	502 (5.0)	11 (2.0)	504 (6.9)	9 (1.7)	501 (6.6)	22 (0.7)
Azerbaijan	60 (4.5)	465 (6.5)	26 (3.1)	461 (12.0)	10 (2.7)	438 (19.8)	4 (2.0)	461 (27.9)	23 (1.0)
Bahrain	13 (3.9)	439 (12.8)	45 (4.6)	435 (5.1)	32 (5.5)	437 (5.8)	10 (2.6)	440 (16.4)	12 (0.7)
Belgium (Flemish)	42 (3.4)	553 (3.2)	29 (3.4)	545 (3.2)	19 (3.2)	549 (4.1)	10 (2.3)	542 (6.1)	17 (0.7)
Chile	39 (3.7)	464 (5.4)	26 (3.9)	464 (7.0)	12 (2.6)	457 (10.1)	23 (3.5)	458 (8.7)	17 (0.9)
Chinese Taipei	26 (3.3)	595 (3.9)	50 (3.8)	589 (2.9)	17 (3.3)	600 (5.3)	7 (2.0)	576 (5.2)	15 (0.6)
Croatia	56 (3.4)	495 (2.5)	30 (2.9)	482 (4.0)	9 (2.0)	494 (5.7)	5 (1.4)	492 (6.6)	21 (0.7)
Czech Republic	51 (4.1)	508 (3.6)	26 (3.5)	511 (3.9)	12 (2.4)	516 (7.4)	12 (2.5)	517 (9.1)	19 (0.8)
Denmark	34 (3.4)	540 (4.1)	27 (3.6)	536 (5.2)	23 (3.1)	542 (2.9)	16 (2.4)	538 (6.6)	16 (0.7)
England	21 (3.3)	560 (9.1)	29 (4.4)	549 (7.6)	20 (3.6)	549 (7.2)	30 (3.9)	531 (6.9)	12 (0.8)
Finland	41 (3.2)	545 (3.0)	34 (3.1)	549 (3.2)	13 (2.1)	550 (5.3)	13 (1.9)	537 (9.2)	17 (0.6)
Georgia	60 (3.9)	446 (4.2)	30 (3.7)	453 (9.1)	5 (1.2)	471 (33.0)	5 (1.8)	453 (24.3)	23 (0.9)
Germany	47 (3.4)	528 (3.4)	25 (2.9)	530 (4.9)	13 (2.5)	531 (6.5)	15 (2.4)	525 (5.3)	19 (0.9)
Hong Kong SAR	25 (4.2)	612 (5.5)	51 (4.6)	599 (5.6)	10 (3.0)	598 (13.4)	14 (2.8)	595 (8.3)	14 (0.8)
Hungary	70 (3.3)	517 (3.8)	17 (2.7)	515 (15.2)	7 (1.8)	511 (15.0)	5 (1.7)	493 (17.8)	24 (0.7)
Iran, Islamic Rep. of	41 (3.6)	453 (6.1)	41 (3.5)	419 (6.2)	10 (1.9)	419 (14.8)	9 (1.8)	400 (12.2)	17 (0.6)
Ireland	25 (3.1)	536 (7.0)	21 (3.4)	529 (6.5)	27 (3.1)	524 (4.7)	27 (3.2)	522 (5.7)	12 (0.6)
Italy	69 (3.1)	510 (3.4)	21 (2.8)	507 (5.3)	7 (1.8)	502 (11.0)	4 (1.5)	516 (9.6)	24 (0.7)
Japan	47 (3.9)	586 (2.7)	14 (2.9)	580 (3.6)	18 (2.7)	587 (4.2)	21 (3.1)	587 (4.1)	17 (0.9)
Kazakhstan	53 (4.0)	501 (6.1)	31 (3.4)	513 (8.6)	8 (2.3)	468 (15.4)	8 (2.1)	504 (22.6)	20 (0.8)
Korea, Rep. of	38 (4.0)	606 (2.8)	25 (4.1)	609 (4.8)	21 (3.4)	605 (4.2)	17 (3.6)	596 (5.9)	15 (0.9)
Kuwait	2 (1.1)	~ ~	29 (3.3)	346 (6.9)	37 (4.0)	342 (5.8)	32 (3.7)	337 (6.6)	8 (0.3)
Lithuania	71 (2.6)	531 (3.1)	27 (2.5)	540 (5.2)	2 (1.0)	~ ~	1 (0.5)	~ ~	24 (0.6)
Malta	20 (0.1)	502 (2.8)	36 (0.1)	497 (2.2)	32 (0.1)	494 (2.5)	12 (0.1)	490 (4.6)	13 (0.0)
Morocco	51 (4.5)	332 (5.8)	33 (4.4)	328 (7.8)	8 (1.8)	368 (21.2)	8 (1.7)	379 (28.2)	20 (0.8)
Netherlands r	31 (4.8)	538 (4.6)	27 (4.3)	540 (4.2)	29 (5.0)	540 (5.1)	13 (3.0)	536 (5.2)	16 (1.2)
New Zealand	25 (2.6)	484 (5.7)	27 (2.6)	486 (4.8)	25 (2.7)	489 (5.4)	23 (2.8)	487 (6.0)	13 (0.6)
Northern Ireland r	34 (4.7)	559 (5.9)	35 (3.9)	568 (5.8)	24 (4.2)	561 (9.2)	7 (2.3)	566 (23.8)	17 (1.0)
Norway	31 (4.3)	494 (4.3)	37 (4.8)	499 (4.6)	19 (4.2)	483 (5.6)	13 (2.4)	501 (6.3)	16 (1.0)
Oman	7 (1.6)	374 (20.6)	21 (2.7)	393 (7.7)	56 (3.1)	388 (4.0)	16 (1.7)	375 (5.8)	9 (0.3)
Poland	83 (2.2)	481 (2.3)	11 (2.1)	488 (8.0)	4 (1.5)	464 (9.6)	2 (0.9)	~ ~	23 (0.4)
Portugal	36 (3.2)	546 (4.9)	46 (3.8)	520 (5.3)	14 (2.9)	526 (8.9)	4 (1.6)	565 (17.1)	17 (0.6)
Qatar	24 (3.3)	444 (9.4)	24 (4.3)	411 (15.1)	25 (3.9)	421 (11.8)	27 (3.9)	388 (10.1)	11 (0.6)
Romania	57 (3.7)	492 (5.5)	31 (3.5)	467 (10.6)	9 (2.3)	455 (21.2)	2 (1.0)	~ ~	23 (0.8)
Russian Federation	73 (3.0)	543 (3.8)	22 (2.7)	544 (9.0)	3 (1.1)	507 (22.1)	3 (1.5)	524 (16.2)	25 (0.7)
Saudi Arabia	18 (2.9)	417 (9.3)	47 (4.4)	417 (8.8)	19 (3.8)	387 (10.4)	16 (3.1)	405 (10.0)	13 (0.5)
Serbia	63 (3.3)	514 (4.4)	31 (3.2)	525 (4.8)	5 (1.3)	487 (11.8)	2 (1.0)	~ ~	22 (0.6)
Singapore	12 (1.5)	593 (9.6)	26 (2.5)	606 (6.7)	30 (2.5)	614 (6.2)	32 (2.3)	604 (5.6)	10 (0.4)
Slovak Republic	55 (2.8)	506 (5.5)	26 (2.6)	503 (5.3)	10 (2.1)	520 (10.1)	9 (1.9)	497 (11.0)	20 (0.6)
Slovenia	57 (3.8)	514 (2.2)	27 (3.1)	518 (4.8)	10 (2.2)	499 (7.2)	6 (1.5)	505 (7.8)	21 (0.7)
Spain	59 (4.2)	490 (4.0)	21 (3.9)	476 (6.1)	6 (1.5)	480 (12.6)	14 (3.2)	462 (9.6)	21 (0.9)
Sweden r	33 (4.3)	506 (3.6)	42 (4.5)	506 (4.3)	16 (2.9)	499 (4.5)	9 (2.1)	507 (5.4)	16 (0.8)
Thailand	47 (4.5)	463 (4.7)	25 (4.0)	455 (15.1)	14 (3.2)	448 (13.5)	15 (3.4)	469 (10.8)	19 (1.1)
Tunisia	55 (4.2)	370 (5.9)	24 (3.6)	349 (8.1)	11 (2.4)	340 (14.3)	11 (2.6)	354 (12.7)	18 (0.8)
Turkey	21 (2.7)	505 (7.6)	38 (3.0)	481 (5.6)	20 (2.5)	457 (12.9)	21 (2.8)	421 (13.0)	13 (0.5)
United Arab Emirates	13 (2.0)	448 (10.1)	30 (2.1)	424 (5.7)	28 (2.5)	429 (5.0)	29 (2.2)	444 (6.1)	10 (0.4)
United States	25 (2.0)	543 (4.2)	38 (2.7)	544 (3.7)	23 (2.2)	541 (3.8)	14 (1.6)	543 (6.0)	14 (0.5)
Yemen	15 (3.1)	259 (13.6)	60 (4.4)	239 (7.3)	15 (3.4)	276 (14.6)	11 (2.5)	256 (20.9)	14 (0.5)
International Avg.	41 (0.5)	498 (0.9)	30 (0.5)	490 (1.0)	16 (0.4)	486 (1.6)	13 (0.3)	486 (2.0)	17 (0.1)

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A tilde (~) indicates insufficient data to report achievement.
An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 7.5: Teachers' Years of Experience (Continued)

Country	20 Years or More		At Least 10 but Less than 20 Years		At Least 5 but Less than 10 Years		Less than 5 Years		Average Years of Experience
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Sixth Grade Participants									
Botswana	26 (3.6)	431 (9.6)	34 (4.2)	429 (9.8)	22 (3.7)	402 (7.6)	19 (2.6)	409 (8.8)	13 (0.7)
Honduras	29 (4.2)	408 (6.8)	37 (4.6)	378 (8.0)	17 (3.7)	413 (10.0)	17 (4.0)	411 (21.5)	14 (0.9)
Yemen	15 (3.0)	374 (9.6)	50 (4.1)	343 (8.5)	18 (3.4)	356 (14.1)	16 (3.3)	328 (12.5)	12 (0.6)
Benchmarking Participants									
Alberta, Canada r	36 (4.3)	512 (4.2)	24 (4.1)	503 (4.4)	26 (4.3)	501 (7.0)	14 (3.4)	509 (5.3)	15 (0.9)
Ontario, Canada	17 (2.4)	516 (7.7)	40 (3.4)	518 (4.7)	29 (3.1)	518 (4.5)	13 (2.7)	526 (6.4)	12 (0.4)
Quebec, Canada	32 (4.2)	530 (4.1)	40 (4.6)	535 (3.3)	20 (3.6)	532 (6.4)	8 (2.0)	536 (6.4)	15 (0.7)
Abu Dhabi, UAE	15 (3.8)	432 (16.0)	31 (3.9)	408 (11.8)	27 (3.8)	401 (7.7)	28 (3.8)	438 (10.2)	10 (0.6)
Dubai, UAE r	18 (4.3)	478 (13.2)	27 (3.0)	471 (6.6)	26 (3.5)	462 (8.7)	29 (4.4)	470 (11.1)	11 (0.9)
Florida, US r	16 (3.1)	544 (10.9)	34 (4.8)	553 (6.0)	30 (4.2)	535 (6.4)	20 (3.7)	538 (9.0)	12 (0.9)
North Carolina, US	19 (4.4)	564 (9.8)	36 (5.0)	556 (6.7)	24 (4.2)	559 (8.2)	21 (4.0)	531 (7.7)	12 (1.0)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 7.6: Teachers' Years of Experience

TIMSS 2011 8th Grade Mathematics

Reported by Teachers

Country	20 Years or More		At Least 10 but Less than 20 Years		At Least 5 but Less than 10 Years		Less than 5 Years		Average Years of Experience
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Armenia	63 (3.7)	467 (3.9)	30 (3.3)	464 (6.0)	4 (1.6)	473 (24.9)	3 (1.4)	474 (18.4)	24 (0.8)
Australia r	37 (4.0)	519 (8.1)	22 (3.4)	513 (10.8)	18 (3.2)	504 (17.1)	24 (3.4)	485 (8.4)	15 (0.9)
Bahrain	19 (2.2)	433 (7.0)	54 (3.6)	404 (3.7)	17 (2.7)	403 (5.8)	10 (1.9)	430 (9.1)	14 (0.4)
Chile	49 (3.8)	415 (4.6)	15 (2.9)	416 (10.0)	13 (2.8)	421 (12.1)	22 (3.4)	421 (6.3)	19 (1.0)
Chinese Taipei	24 (3.6)	621 (7.2)	41 (3.6)	607 (5.8)	26 (3.5)	608 (9.3)	9 (2.5)	593 (8.9)	14 (0.7)
England	21 (3.6)	510 (15.5)	25 (3.7)	516 (11.8)	22 (3.9)	495 (11.6)	32 (3.9)	503 (10.7)	12 (0.9)
Finland	41 (3.4)	517 (2.8)	27 (3.4)	511 (5.3)	18 (2.8)	515 (6.1)	15 (2.4)	510 (5.2)	16 (0.7)
Georgia	63 (3.9)	428 (5.2)	21 (3.5)	441 (10.1)	9 (2.4)	439 (15.0)	7 (2.3)	431 (18.5)	25 (1.1)
Ghana	6 (1.8)	360 (19.9)	23 (3.8)	340 (9.0)	28 (4.0)	334 (9.3)	43 (3.9)	321 (6.8)	8 (0.5)
Hong Kong SAR	18 (3.3)	570 (11.9)	39 (4.3)	590 (8.4)	25 (4.2)	589 (11.9)	18 (3.3)	588 (10.1)	12 (0.7)
Hungary	62 (3.5)	508 (4.4)	26 (3.0)	508 (6.2)	7 (1.9)	488 (18.6)	5 (1.5)	456 (21.5)	22 (0.7)
Indonesia	25 (3.9)	402 (9.1)	30 (4.0)	399 (9.1)	19 (3.3)	385 (8.0)	26 (4.5)	356 (9.1)	13 (0.8)
Iran, Islamic Rep. of	28 (3.2)	443 (8.9)	40 (3.8)	416 (6.0)	16 (2.6)	402 (10.4)	16 (2.8)	374 (10.7)	14 (0.6)
Israel	38 (2.8)	545 (6.6)	36 (2.8)	518 (6.6)	15 (2.0)	495 (10.7)	11 (1.8)	468 (14.4)	17 (0.5)
Italy	60 (4.1)	502 (3.2)	22 (3.3)	492 (7.3)	11 (2.5)	504 (9.1)	8 (2.1)	492 (13.6)	22 (0.9)
Japan	47 (3.9)	576 (3.7)	18 (3.1)	558 (5.5)	17 (2.3)	575 (9.1)	18 (3.1)	559 (7.5)	17 (0.8)
Jordan	16 (2.6)	406 (8.5)	29 (3.3)	410 (7.6)	29 (3.5)	394 (9.6)	26 (3.1)	413 (7.0)	11 (0.6)
Kazakhstan	62 (3.9)	492 (5.2)	21 (3.2)	468 (8.6)	9 (2.7)	489 (14.9)	8 (2.2)	493 (14.8)	22 (0.9)
Korea, Rep. of	34 (3.1)	618 (5.0)	22 (2.8)	616 (8.8)	17 (2.1)	625 (7.1)	27 (2.6)	594 (4.8)	13 (0.6)
Lebanon	27 (3.6)	454 (7.9)	32 (3.9)	445 (6.9)	21 (3.2)	460 (9.8)	20 (3.5)	445 (8.7)	14 (1.0)
Lithuania	73 (3.4)	501 (3.0)	17 (2.6)	509 (6.8)	7 (2.1)	504 (19.6)	3 (1.4)	506 (17.8)	25 (0.8)
Macedonia, Rep. of r	50 (4.4)	421 (9.1)	25 (4.2)	430 (12.0)	12 (2.7)	415 (15.3)	13 (2.9)	420 (18.6)	20 (0.9)
Malaysia	18 (3.0)	446 (12.2)	31 (3.4)	446 (9.5)	21 (3.0)	426 (11.4)	30 (3.3)	441 (10.5)	11 (0.7)
Morocco	69 (2.8)	374 (2.8)	11 (2.0)	373 (9.0)	5 (1.5)	358 (12.2)	15 (2.3)	363 (6.3)	22 (0.6)
New Zealand	36 (3.0)	492 (8.4)	22 (2.7)	486 (9.6)	25 (3.0)	489 (8.9)	17 (2.8)	482 (15.6)	15 (0.8)
Norway	30 (4.0)	478 (3.7)	25 (3.6)	474 (5.5)	19 (3.7)	475 (4.4)	26 (3.5)	474 (4.0)	15 (1.0)
Oman	7 (1.3)	362 (12.2)	25 (2.6)	385 (6.5)	46 (3.3)	363 (4.7)	21 (2.6)	360 (6.9)	9 (0.3)
Palestinian Nat'l Auth.	14 (3.1)	413 (11.9)	37 (3.9)	410 (7.3)	24 (3.6)	400 (7.6)	25 (3.2)	394 (7.5)	11 (0.7)
Qatar	23 (4.2)	432 (12.7)	36 (4.6)	425 (9.4)	25 (3.4)	388 (9.2)	16 (2.9)	386 (10.1)	13 (0.7)
Romania	66 (3.7)	466 (5.2)	24 (3.3)	449 (9.3)	6 (1.7)	420 (15.9)	4 (1.6)	423 (12.7)	25 (0.9)
Russian Federation	67 (3.3)	540 (4.4)	24 (3.1)	543 (7.0)	5 (1.2)	515 (15.2)	4 (1.2)	547 (23.5)	24 (0.6)
Saudi Arabia	13 (2.9)	386 (10.2)	41 (3.9)	406 (7.3)	25 (3.5)	402 (8.9)	21 (3.5)	367 (7.7)	11 (0.6)
Singapore	10 (1.4)	618 (10.6)	16 (2.1)	619 (9.3)	26 (2.4)	624 (7.3)	47 (2.5)	601 (5.0)	8 (0.4)
Slovenia	52 (2.9)	506 (3.2)	20 (2.6)	500 (5.0)	17 (2.0)	500 (4.1)	12 (1.9)	515 (4.9)	19 (0.6)
Sweden r	26 (2.7)	486 (5.4)	42 (3.4)	489 (3.9)	22 (2.7)	482 (3.7)	10 (2.0)	476 (5.1)	15 (0.6)
Syrian Arab Republic	16 (3.1)	400 (9.6)	26 (3.7)	375 (7.9)	24 (3.6)	370 (8.8)	35 (4.0)	378 (8.7)	10 (0.6)
Thailand	34 (3.4)	444 (8.4)	21 (3.1)	432 (11.0)	18 (2.7)	417 (11.6)	28 (3.2)	415 (8.7)	15 (0.8)
Tunisia	38 (3.3)	442 (5.6)	35 (3.3)	419 (5.4)	18 (2.8)	417 (7.5)	10 (2.1)	394 (7.2)	16 (0.7)
Turkey	11 (2.2)	471 (14.5)	24 (3.2)	481 (10.8)	38 (3.5)	445 (6.9)	27 (2.8)	431 (6.5)	9 (0.5)
Ukraine	68 (4.4)	477 (4.5)	20 (3.6)	491 (10.0)	9 (2.5)	473 (11.1)	3 (1.4)	473 (18.7)	25 (1.0)
United Arab Emirates	24 (2.0)	442 (6.4)	36 (2.4)	455 (4.0)	26 (2.3)	461 (4.8)	14 (1.8)	467 (6.8)	13 (0.4)
United States r	26 (2.2)	519 (6.8)	28 (2.4)	517 (5.1)	28 (2.8)	506 (7.2)	17 (2.2)	505 (6.7)	14 (0.6)
International Avg.	36 (0.5)	474 (1.3)	28 (0.5)	470 (1.2)	19 (0.4)	463 (1.7)	18 (0.4)	458 (1.8)	16 (0.1)

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A tilde (~) indicates insufficient data to report achievement.
An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 7.6: Teachers' Years of Experience (Continued)

Country	20 Years or More		At Least 10 but Less than 20 Years		At Least 5 but Less than 10 Years		Less than 5 Years		Average Years of Experience
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Ninth Grade Participants									
Botswana	2 (1.0)	~ ~	39 (4.5)	401 (5.3)	31 (4.3)	403 (4.2)	29 (3.9)	384 (5.2)	9 (0.4)
Honduras r	26 (3.8)	341 (6.5)	23 (4.2)	335 (10.8)	22 (4.4)	332 (8.4)	29 (4.2)	339 (11.1)	12 (0.9)
South Africa	30 (3.8)	344 (7.3)	33 (3.4)	358 (5.8)	18 (3.0)	364 (8.6)	19 (3.1)	345 (8.7)	14 (0.8)
Benchmarking Participants									
Alberta, Canada	25 (3.5)	506 (5.0)	37 (4.3)	504 (3.8)	15 (3.0)	504 (6.9)	23 (3.4)	505 (5.3)	13 (0.7)
Ontario, Canada	16 (2.8)	511 (7.5)	44 (4.2)	512 (3.8)	31 (3.5)	516 (4.9)	10 (2.5)	511 (9.4)	12 (0.5)
Quebec, Canada	19 (3.0)	544 (6.6)	47 (3.8)	536 (4.2)	22 (3.2)	524 (7.0)	12 (2.6)	521 (7.3)	13 (0.6)
Abu Dhabi, UAE	25 (4.1)	456 (14.3)	30 (4.1)	433 (6.3)	29 (4.6)	456 (8.5)	16 (3.2)	463 (9.2)	14 (0.9)
Dubai, UAE	19 (2.2)	443 (9.5)	42 (2.6)	491 (5.0)	25 (3.3)	488 (8.7)	13 (2.6)	471 (13.9)	13 (0.5)
Alabama, US r	16 (4.8)	494 (20.4)	35 (7.8)	473 (11.2)	32 (6.2)	450 (12.0)	17 (5.7)	464 (11.2)	12 (1.3)
California, US r	19 (5.4)	502 (25.5)	33 (6.9)	490 (9.2)	28 (6.4)	506 (10.2)	20 (5.9)	479 (21.5)	12 (1.3)
Colorado, US r	21 (4.9)	564 (9.3)	32 (5.6)	517 (11.3)	32 (5.8)	508 (14.0)	15 (3.5)	471 (13.3)	13 (1.0)
Connecticut, US	29 (6.2)	531 (17.9)	32 (5.6)	533 (9.2)	20 (4.8)	509 (18.9)	19 (5.5)	503 (14.5)	14 (1.3)
Florida, US r	18 (5.3)	530 (13.7)	43 (7.0)	521 (10.5)	26 (5.8)	514 (14.6)	13 (4.0)	524 (29.0)	13 (1.2)
Indiana, US r	34 (5.6)	526 (11.0)	22 (5.8)	533 (13.8)	27 (6.0)	516 (12.2)	17 (5.2)	494 (9.9)	15 (1.4)
Massachusetts, US	10 (4.1)	566 (20.3)	33 (5.8)	569 (10.9)	39 (5.2)	552 (8.5)	18 (5.5)	556 (17.9)	11 (1.3)
Minnesota, US	27 (6.4)	556 (9.3)	36 (5.2)	553 (8.9)	22 (4.5)	531 (15.3)	15 (4.3)	528 (17.9)	15 (1.5)
North Carolina, US r	26 (5.5)	559 (13.2)	30 (5.6)	530 (14.8)	33 (5.5)	545 (13.2)	11 (4.3)	517 (12.7)	14 (1.0)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 7.7: Teacher Participation in Professional Development in Mathematics in the Past Two Years

TIMSS 2011 Mathematics 4th Grade

Reported by Teachers

Country	Percent of Students by Teacher's Area of Professional Development									
	Mathematics Content		Mathematics Pedagogy / Instruction		Mathematics Curriculum		Integrating Information Technology into Mathematics		Mathematics Assessment	
Armenia		60 (3.7)		65 (3.3)		74 (2.9)		48 (3.7)		77 (3.1)
Australia	r	66 (3.7)	r	65 (4.0)	r	62 (3.7)	r	51 (4.3)	r	49 (3.6)
Austria		75 (2.8)		55 (3.5)		33 (3.4)		15 (2.4)		27 (3.1)
Azerbaijan		69 (3.7)		67 (3.3)		47 (3.7)		53 (4.3)		76 (3.2)
Bahrain		48 (5.1)		50 (5.0)		50 (4.9)		52 (5.6)		42 (5.0)
Belgium (Flemish)		12 (2.8)		11 (2.8)		20 (3.1)		21 (3.1)		6 (1.8)
Chile	r	48 (4.4)	r	31 (3.9)	r	24 (3.4)	r	36 (4.2)	r	30 (3.7)
Chinese Taipei		45 (3.9)		42 (3.8)		50 (3.9)		41 (4.0)		34 (3.9)
Croatia		57 (3.7)		50 (3.2)		51 (3.7)		21 (2.9)		52 (4.0)
Czech Republic		16 (2.7)		26 (3.7)		8 (2.3)		22 (3.3)		11 (2.6)
Denmark	r	29 (4.3)	r	33 (4.3)	r	13 (3.0)	r	20 (3.3)	r	24 (3.6)
England		54 (4.3)		71 (3.7)		46 (3.7)		30 (4.1)		59 (4.4)
Finland		9 (2.1)		20 (2.6)		3 (1.0)		9 (1.9)		3 (1.1)
Georgia		14 (2.7)		28 (3.8)		36 (4.2)		22 (2.9)		35 (4.1)
Germany		55 (3.7)		44 (3.1)		33 (3.1)		5 (1.6)		27 (3.1)
Hong Kong SAR		66 (4.0)		81 (3.8)		53 (4.5)		56 (4.7)		53 (4.6)
Hungary		28 (3.1)		45 (3.8)		13 (2.6)		22 (3.1)		22 (3.0)
Iran, Islamic Rep. of		42 (3.8)		47 (4.1)		29 (3.1)		16 (2.6)		26 (3.1)
Ireland		32 (3.4)		32 (3.7)		34 (3.5)		31 (3.4)		25 (3.4)
Italy		28 (3.5)		38 (3.7)		27 (3.3)		22 (2.9)		21 (2.8)
Japan		54 (3.6)		59 (3.5)		24 (3.2)		23 (3.0)		23 (2.8)
Kazakhstan		52 (4.4)		60 (4.0)		61 (4.3)		77 (3.3)		60 (4.3)
Korea, Rep. of		32 (3.8)		40 (3.8)		47 (4.4)		10 (2.1)		31 (4.1)
Kuwait		79 (3.5)		73 (3.5)		81 (3.1)		41 (3.9)		49 (3.9)
Lithuania		33 (3.4)		31 (3.3)		51 (3.7)		66 (3.0)		48 (3.0)
Malta		18 (0.1)		21 (0.1)		17 (0.1)		32 (0.1)		23 (0.1)
Morocco	r	14 (2.3)	r	18 (2.5)	r	16 (2.4)	r	8 (1.6)	r	16 (2.6)
Netherlands	r	22 (4.0)	r	27 (3.9)	r	11 (2.5)	r	20 (4.5)	r	18 (3.8)
New Zealand		72 (2.7)		67 (3.1)		68 (2.9)		35 (3.0)		58 (3.0)
Northern Ireland	r	55 (5.1)	r	64 (4.5)	r	62 (4.7)	r	55 (4.0)	r	61 (4.1)
Norway		25 (4.5)		30 (4.4)		11 (2.6)		11 (2.7)		16 (3.8)
Oman		41 (3.0)		50 (3.0)		37 (3.4)		24 (2.5)		47 (3.2)
Poland		61 (3.7)		31 (3.2)		49 (3.5)		34 (3.5)		24 (3.5)
Portugal		58 (4.2)		54 (4.5)		61 (3.9)		36 (3.7)		25 (4.0)
Qatar		55 (3.4)		56 (3.9)		51 (4.0)		56 (4.9)		49 (3.9)
Romania		54 (3.5)		50 (3.8)		54 (3.5)		34 (3.7)		61 (3.6)
Russian Federation		58 (4.5)		59 (3.9)		76 (3.7)		65 (3.4)		64 (4.1)
Saudi Arabia		59 (4.2)		73 (3.4)		65 (4.2)		41 (4.2)		43 (4.6)
Serbia		60 (3.6)		39 (3.8)		45 (4.0)		20 (3.0)		33 (3.8)
Singapore		68 (2.6)		82 (2.1)		58 (2.8)		57 (2.9)		63 (2.9)
Slovak Republic		11 (2.3)		20 (3.0)		45 (3.2)		47 (3.3)		17 (2.8)
Slovenia		32 (3.4)		23 (3.3)		45 (3.9)		44 (3.5)		43 (3.5)
Spain		15 (2.9)		25 (3.4)		19 (2.8)		40 (4.0)		14 (2.7)
Sweden	r	53 (3.6)	r	60 (4.0)	r	57 (4.3)	r	10 (2.4)	r	44 (4.1)
Thailand		68 (3.9)		71 (4.3)		78 (3.4)		46 (4.1)		61 (4.1)
Tunisia		31 (4.1)		54 (4.6)		30 (4.2)		12 (2.4)		40 (4.1)
Turkey		10 (2.2)		11 (2.2)		12 (2.1)		12 (2.0)		9 (1.9)
United Arab Emirates		49 (2.7)		57 (2.5)		46 (2.2)		45 (2.9)		49 (2.4)
United States	r	68 (2.1)	r	55 (2.4)	r	68 (2.5)	r	49 (2.2)	r	53 (2.1)
Yemen		22 (3.8)		40 (4.5)		19 (3.7)		6 (2.1)		25 (3.9)
International Avg.		44 (0.5)		46 (0.5)		41 (0.5)		33 (0.5)		37 (0.5)

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 7.7: Teacher Participation in Professional Development in Mathematics in the Past Two Years (Continued)

Country	Percent of Students by Teacher's Area of Professional Development									
	Mathematics Content		Mathematics Pedagogy / Instruction		Mathematics Curriculum		Integrating Information Technology into Mathematics		Mathematics Assessment	
Sixth Grade Participants										
Botswana	r	16 (3.2)	r	8 (2.2)	r	14 (3.2)	r	12 (2.8)	r	27 (4.1)
Honduras		82 (3.5)		63 (5.0)		55 (4.8)		29 (3.4)		49 (4.7)
Yemen		19 (3.4)		39 (4.1)		19 (3.8)		7 (2.5)		25 (4.1)
Benchmarking Participants										
Alberta, Canada	r	71 (4.2)	r	70 (4.0)	r	68 (4.0)	r	50 (4.9)	r	63 (3.9)
Ontario, Canada		52 (4.0)		60 (3.7)		44 (3.9)		23 (3.3)		52 (3.8)
Quebec, Canada		58 (4.1)		55 (4.2)		35 (4.2)		18 (3.4)		57 (4.7)
Abu Dhabi, UAE		50 (4.7)		61 (4.3)		48 (4.5)		45 (4.8)		46 (4.8)
Dubai, UAE		49 (4.0)	r	48 (4.3)	r	46 (4.3)		55 (4.1)		51 (4.3)
Florida, US	r	84 (3.0)	r	66 (4.6)	r	90 (2.7)	r	72 (4.4)	r	54 (5.0)
North Carolina, US		77 (5.4)		62 (5.1)		72 (5.4)		68 (4.6)		64 (5.7)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 7.8: Teacher Participation in Professional Development in Mathematics in the Past Two Years

TIMSS 2011 Mathematics 8th Grade

Reported by Teachers

Country	Percent of Students by Teacher's Area of Professional Development											
	Mathematics Content		Mathematics Pedagogy / Instruction		Mathematics Curriculum		Integrating Information Technology into Mathematics		Improving Students' Critical Thinking or Problem Solving Skills		Mathematics Assessment	
Armenia		67 (3.9)		78 (3.2)		84 (2.7)		36 (3.8)		40 (4.0)		80 (3.1)
Australia	r	52 (4.5)	r	65 (3.7)	r	55 (4.6)	r	69 (3.7)	r	48 (5.2)	r	39 (4.3)
Bahrain		31 (2.5)		51 (3.9)		33 (1.9)		40 (2.5)		47 (3.6)		44 (2.8)
Chile		63 (4.1)		46 (4.0)		38 (4.3)		49 (3.9)		33 (3.8)		33 (3.9)
Chinese Taipei		73 (3.6)		61 (4.1)		67 (3.8)		71 (4.1)		33 (4.3)		42 (3.6)
England		60 (4.6)		73 (4.3)		62 (3.8)		48 (4.4)		53 (5.0)		51 (4.0)
Finland		9 (1.8)		21 (3.1)		6 (1.6)		16 (2.3)		8 (2.0)		5 (1.5)
Georgia		54 (3.7)		52 (3.7)		42 (3.7)		43 (3.9)		41 (3.3)		47 (3.3)
Ghana		68 (3.8)		52 (4.3)		59 (4.1)		25 (4.2)		66 (3.9)		68 (3.5)
Hong Kong SAR		70 (3.9)		68 (4.5)		71 (4.0)		51 (4.3)		49 (4.7)		63 (3.9)
Hungary		34 (4.0)		67 (3.8)		14 (2.6)		46 (3.7)		38 (3.6)		24 (3.3)
Indonesia		71 (4.5)		50 (4.6)		71 (4.3)		37 (4.3)		59 (4.6)		71 (4.2)
Iran, Islamic Rep. of		52 (3.0)		68 (2.9)		32 (3.4)		42 (2.4)		42 (3.1)		33 (3.7)
Israel		79 (2.6)		77 (2.8)		84 (2.0)		36 (3.3)		43 (3.6)		40 (3.2)
Italy		23 (3.3)		45 (4.0)		29 (3.5)		45 (4.0)		13 (2.5)		26 (3.5)
Japan		66 (4.2)		70 (3.6)		41 (4.0)		23 (3.5)		33 (3.8)		26 (3.8)
Jordan		24 (3.6)		36 (3.4)		20 (3.3)		38 (3.5)		40 (3.9)		31 (3.6)
Kazakhstan		74 (3.4)		78 (3.4)		68 (3.8)		85 (2.9)		66 (3.9)		56 (3.9)
Korea, Rep. of		51 (2.8)		61 (3.0)		53 (3.0)		27 (2.5)		32 (3.1)		46 (3.1)
Lebanon		56 (3.8)		59 (4.3)		47 (4.4)		54 (4.4)		59 (4.2)		51 (4.2)
Lithuania		76 (3.2)		60 (3.2)		88 (2.1)		63 (4.0)		37 (4.0)		62 (3.6)
Macedonia, Rep. of	r	79 (3.8)	r	67 (4.3)	r	81 (3.6)	r	90 (2.1)	r	66 (3.9)	r	90 (2.8)
Malaysia		40 (4.2)		42 (4.1)		35 (3.7)		41 (4.1)		36 (3.8)		46 (4.2)
Morocco		38 (2.9)		52 (2.9)		41 (3.2)		60 (2.7)		28 (3.2)		32 (2.7)
New Zealand		64 (3.8)		60 (4.8)		73 (3.4)		53 (4.0)		47 (4.0)		50 (3.6)
Norway		21 (3.2)		27 (3.6)		14 (2.6)		19 (3.6)		15 (2.7)		29 (3.8)
Oman		47 (3.5)		53 (3.3)		34 (3.1)		33 (3.3)		47 (3.8)		44 (3.1)
Palestinian Nat'l Auth.		30 (3.8)		43 (4.1)		18 (3.2)		33 (3.6)		49 (3.9)		37 (4.2)
Qatar		69 (3.1)		71 (3.1)		66 (2.6)		66 (3.1)		60 (3.1)		57 (3.5)
Romania		70 (3.7)		63 (3.9)		49 (3.9)		47 (4.2)		46 (4.1)		76 (3.2)
Russian Federation		68 (2.8)		69 (2.8)		65 (3.0)		73 (2.8)		43 (3.2)		46 (3.8)
Saudi Arabia		56 (4.4)		63 (3.9)		60 (4.1)		28 (3.6)		45 (4.0)		34 (4.3)
Singapore		67 (2.1)		79 (2.1)		55 (2.5)		68 (2.5)		48 (2.8)		58 (2.4)
Slovenia		62 (3.1)		59 (2.8)		46 (2.8)		68 (2.9)		34 (3.0)		38 (2.8)
Sweden	r	36 (3.8)	r	45 (3.9)	r	50 (3.5)	r	11 (2.4)	r	24 (3.4)	r	41 (3.6)
Syrian Arab Republic		27 (3.7)		41 (4.4)		32 (4.1)		35 (4.2)		45 (4.8)		35 (4.3)
Thailand		76 (3.6)		72 (3.4)		78 (3.4)		61 (3.9)		59 (3.6)		63 (3.5)
Tunisia		71 (3.8)		62 (3.7)		68 (3.8)		50 (3.5)		39 (3.0)		57 (4.1)
Turkey		30 (2.8)		41 (3.3)		31 (3.0)		29 (2.8)		31 (3.1)		26 (3.2)
Ukraine		77 (3.7)		85 (3.3)		83 (3.4)		80 (3.6)		59 (4.0)		73 (3.9)
United Arab Emirates		47 (2.7)		52 (2.7)		54 (2.6)		48 (2.8)		56 (2.4)		52 (2.6)
United States	r	73 (2.1)	r	73 (2.0)	r	78 (2.2)	r	68 (2.1)	r	61 (2.5)	r	61 (2.9)
International Avg.		55 (0.5)		58 (0.6)		52 (0.5)		48 (0.5)		43 (0.6)		47 (0.5)

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 7.8: Teacher Participation in Professional Development in Mathematics in the Past Two Years (Continued)

Country	Percent of Students by Teacher's Area of Professional Development											
	Mathematics Content		Mathematics Pedagogy / Instruction		Mathematics Curriculum		Integrating Information Technology into Mathematics		Improving Students' Critical Thinking or Problem Solving Skills		Mathematics Assessment	
Ninth Grade Participants												
Botswana		24 (3.7)		30 (4.3)		42 (4.3)		20 (3.4)		29 (4.2)		28 (4.2)
Honduras	r	65 (4.9)	r	49 (5.1)	r	44 (5.4)	r	26 (4.7)	r	40 (4.5)	r	44 (5.4)
South Africa		73 (3.4)		50 (3.8)		71 (3.7)		35 (3.4)		51 (3.6)		69 (3.7)
Benchmarking Participants												
Alberta, Canada		79 (3.5)		81 (3.4)		73 (3.8)		72 (3.4)		63 (4.1)		62 (4.1)
Ontario, Canada		64 (3.6)		71 (3.3)		52 (3.6)		48 (3.9)		70 (3.4)		52 (4.0)
Quebec, Canada		53 (4.3)		46 (4.2)		49 (4.0)		43 (4.0)		17 (2.8)		63 (3.9)
Abu Dhabi, UAE		48 (4.5)		53 (4.1)		58 (4.6)		45 (4.7)		57 (4.3)		55 (4.0)
Dubai, UAE		50 (4.8)		50 (4.6)		59 (4.3)		63 (4.7)		58 (4.2)		55 (4.7)
Alabama, US	r	75 (5.1)	r	73 (7.0)	r	69 (5.9)	r	86 (5.3)	r	66 (6.1)	r	50 (9.4)
California, US	s	69 (6.6)	s	75 (5.6)	s	69 (6.6)	s	53 (6.7)	s	49 (7.1)	s	60 (6.5)
Colorado, US	r	74 (6.9)	r	82 (5.5)	r	82 (5.5)	r	65 (6.8)	r	60 (6.4)	r	48 (7.1)
Connecticut, US		66 (6.2)		71 (4.8)		88 (3.6)		74 (5.4)		51 (5.5)		58 (5.9)
Florida, US	s	91 (4.7)	s	92 (3.8)	s	93 (4.0)	s	87 (5.2)	s	68 (7.5)	s	73 (5.8)
Indiana, US	r	77 (4.6)	r	70 (6.5)	r	86 (4.8)	r	70 (7.1)	r	51 (7.7)	r	51 (7.5)
Massachusetts, US		76 (6.6)	r	80 (4.7)		83 (5.0)		55 (6.2)		49 (6.3)		58 (5.7)
Minnesota, US	r	82 (4.4)	r	77 (6.4)	r	85 (4.7)	r	76 (6.8)	r	47 (6.0)	r	65 (5.7)
North Carolina, US	r	81 (5.5)	r	71 (7.0)	r	79 (6.5)	r	75 (5.4)	r	59 (6.9)	r	67 (7.1)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Teachers' Preparation to Teach the TIMSS Mathematics Topics

Although a sound knowledge of mathematics would seem to be a prerequisite for effective mathematics teaching, evidence directly linking teacher preparation in mathematics to the achievement of their students is scarce. A meta-analysis of the effects of teachers' subject matter preparation on their students' achievement in mathematics and science found some studies showing a positive effect, but in general results were mixed (Wilson, Floden, & Ferrini-Mundi, 2002). However, a study using a direct measure of teachers' mathematics content knowledge as a measure of teacher preparation found that teachers' mathematics content knowledge related to gains in students' mathematics achievement in primary school (Hill, Rowan, & Ball, 2005).

To provide information about how well prepared teachers feel they are to teach mathematics, TIMSS asks the teachers of the students participating in each assessment to indicate whether they felt very well prepared, somewhat prepared, or not well prepared to teach the mathematics content topics assessed by TIMSS.

Exhibit 7.9 presents reports of how teachers felt about their level of preparation to teach the mathematics topics in the fourth grade assessment. The 18 mathematics topics are shown on the second page of the exhibit, grouped by content domain (number, geometric shapes and measures, and data display). With participants listed in alphabetical order, the exhibit presents for each participant the percentage of students taught by teachers who felt

"very well" prepared to teach the TIMSS topics. The results are averaged across all 18 topics for a perspective on mathematics overall, as well as separately by content domain: eight topics in number, seven topics in geometric shapes and measures, and three topics in data display. Internationally across the fourth grade countries, 83 percent of students were taught by teachers who felt very well prepared to teach the TIMSS mathematics topics. Across the content domains, more students had teachers very well prepared to teach the number topics (87%) than the geometric shapes and measures topics (82%) or the data display topics (74%).

Exhibit 7.10 presents reports of teachers about their level of preparation to teach the 19 mathematics topics in the eighth grade assessment. Similar to the fourth grade, 84 percent of the eighth grade students, on average internationally, were taught by teachers who felt very well prepared to teach the TIMSS mathematics topics. Across the content domains, most students had teachers very well prepared to teach the number topics (92%), with relatively fewer well prepared in algebra (87%) and geometry (85%) topics. Only 62 percent of students, on average internationally, had teachers who felt very well prepared to teach the data and chance topics.

Exhibit 7.9: Teachers Feel "Very Well" Prepared to Teach TIMSS Mathematics Topics

TIMSS 2011 Mathematics 4th Grade

Reported by Teachers

Country	Percent of Students Whose Teachers Feel "Very Well" Prepared to Teach TIMSS Mathematics Topics			
	Overall Mathematics (18 Topics)	Number (8 Topics)	Geometric Shapes and Measures (7 Topics)	Data Display (3 Topics)
Armenia	84 (1.7)	90 (1.5)	81 (2.2)	72 (3.1)
Australia	r 90 (1.6)	r 90 (1.7)	r 90 (1.8)	r 92 (2.0)
Austria	– –	– –	– –	– –
Azerbaijan	67 (2.3)	75 (2.6)	72 (2.9)	36 (3.3)
Bahrain	83 (3.7)	87 (4.1)	82 (3.2)	78 (5.2)
Belgium (Flemish)	88 (1.1)	95 (0.8)	82 (1.7)	81 (2.6)
Chile	r 90 (1.6)	r 93 (1.5)	r 85 (2.0)	r 92 (2.2)
Chinese Taipei	86 (2.0)	89 (2.0)	85 (2.3)	81 (2.8)
Croatia	79 (1.3)	91 (1.6)	91 (1.5)	18 (2.1)
Czech Republic	87 (2.0)	91 (1.9)	87 (2.4)	75 (3.0)
Denmark	r 94 (0.9)	r 96 (0.8)	r 94 (1.1)	r 90 (2.0)
England	90 (1.5)	91 (1.6)	89 (1.9)	93 (1.8)
Finland	83 (1.7)	88 (1.6)	77 (2.1)	79 (2.2)
Georgia	89 (1.3)	94 (1.2)	87 (2.0)	77 (2.5)
Germany	76 (1.7)	78 (1.9)	74 (2.1)	73 (2.9)
Hong Kong SAR	77 (2.8)	77 (3.1)	75 (3.2)	83 (3.0)
Hungary	82 (2.0)	89 (1.8)	79 (2.3)	68 (3.2)
Iran, Islamic Rep. of	78 (1.4)	87 (1.6)	80 (1.6)	49 (3.4)
Ireland	88 (1.3)	92 (1.3)	83 (1.8)	86 (2.6)
Italy	69 (2.4)	76 (2.5)	66 (2.7)	60 (3.6)
Japan	54 (2.9)	61 (3.0)	55 (3.3)	38 (3.3)
Kazakhstan	– –	– –	– –	– –
Korea, Rep. of	73 (2.3)	77 (2.7)	75 (2.6)	58 (3.4)
Kuwait	95 (0.8)	98 (0.6)	94 (1.1)	90 (2.2)
Lithuania	91 (1.0)	93 (1.1)	89 (1.2)	92 (1.4)
Malta	91 (0.0)	93 (0.0)	89 (0.1)	91 (0.1)
Morocco	r 75 (2.0)	r 85 (1.9)	r 79 (2.2)	r 41 (4.1)
Netherlands	r 86 (1.8)	r 91 (1.5)	r 79 (3.1)	r 90 (2.2)
New Zealand	79 (1.4)	77 (1.6)	75 (1.8)	90 (1.7)
Northern Ireland	r 91 (1.7)	r 94 (1.8)	r 88 (2.0)	r 92 (2.4)
Norway	78 (2.6)	78 (2.9)	78 (2.8)	77 (3.3)
Oman	87 (1.3)	88 (1.3)	85 (1.6)	87 (2.0)
Poland	91 (0.9)	97 (0.9)	95 (1.1)	68 (2.9)
Portugal	92 (0.9)	92 (1.0)	91 (1.1)	93 (1.8)
Qatar	91 (1.6)	95 (1.3)	89 (1.9)	87 (3.6)
Romania	92 (1.3)	95 (1.3)	91 (1.6)	86 (2.0)
Russian Federation	– –	– –	– –	– –
Saudi Arabia	90 (1.4)	93 (1.4)	90 (1.9)	84 (2.7)
Serbia	80 (1.8)	85 (1.9)	85 (2.1)	54 (3.4)
Singapore	89 (1.2)	93 (1.3)	85 (1.5)	90 (1.6)
Slovak Republic	83 (1.1)	90 (1.2)	89 (1.4)	49 (2.8)
Slovenia	86 (1.2)	86 (1.5)	85 (1.3)	86 (1.9)
Spain	90 (1.6)	94 (1.5)	86 (2.1)	89 (2.2)
Sweden	r 81 (2.1)	r 87 (2.1)	r 74 (2.3)	r 79 (3.3)
Thailand	50 (3.0)	50 (3.1)	48 (3.4)	54 (3.2)
Tunisia	78 (1.9)	85 (2.1)	85 (2.1)	42 (3.5)
Turkey	82 (1.6)	85 (1.7)	77 (2.1)	88 (1.9)
United Arab Emirates	88 (0.9)	93 (0.9)	87 (1.2)	80 (1.7)
United States	r 93 (0.8)	r 95 (0.9)	r 90 (1.2)	r 93 (1.2)
Yemen	73 (2.1)	86 (2.1)	71 (3.2)	42 (3.6)
International Avg.	83 (0.3)	87 (0.3)	82 (0.3)	74 (0.4)

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (–) indicates comparable data not available.
An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 7.9: Teachers Feel "Very Well" Prepared to Teach TIMSS Mathematics Topics (Continued)

Country	Percent of Students Whose Teachers Feel "Very Well" Prepared to Teach TIMSS Mathematics Topics			
	Overall Mathematics (18 Topics)	Number (8 Topics)	Geometric Shapes and Measures (7 Topics)	Data Display (3 Topics)
Sixth Grade Participants				
Botswana	90 (1.7)	93 (1.6)	r 86 (2.2)	92 (2.3)
Honduras	70 (2.8)	82 (2.7)	62 (3.4)	55 (4.3)
Yemen	82 (2.0)	91 (1.5)	76 (3.1)	73 (3.7)
Benchmarking Participants				
Alberta, Canada	r 88 (1.9)	r 91 (1.9)	r 84 (2.8)	r 91 (2.4)
Ontario, Canada	91 (1.5)	89 (1.5)	89 (1.7)	96 (1.4)
Quebec, Canada	90 (1.5)	90 (1.6)	90 (1.8)	91 (2.2)
Abu Dhabi, UAE	89 (1.5)	94 (1.4)	89 (2.2)	78 (3.5)
Dubai, UAE	92 (1.2)	95 (1.1)	r 91 (1.6)	r 87 (1.8)
Florida, US	r 92 (1.7)	r 96 (1.7)	r 92 (1.9)	r 79 (3.9)
North Carolina, US	92 (1.6)	93 (1.6)	90 (2.1)	95 (1.9)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

TIMSS 2011 Mathematics Topics

A. Number

1) Concepts of whole numbers, including place value and ordering
2) Adding, subtracting, multiplying, and/or dividing with whole numbers
3) Concepts of fractions
4) Adding and subtracting with fractions
5) Concepts of decimals, including place value and ordering
6) Adding and subtracting with decimals
7) Number sentences
8) Number patterns

B. Geometric Shapes and Measures

1) Lines: measuring, estimating length of; parallel and perpendicular lines
2) Comparing and drawing angles
3) Using informal coordinate systems to locate points in a plane
4) Elementary properties of common geometric shapes
5) Reflections and rotations
6) Relationships between two-dimensional and three-dimensional shapes
7) Finding and estimating areas, perimeters, and volumes

C. Data Display

1) Reading data from tables, pictographs, bar graphs, or pie charts
2) Drawing conclusions from data displays
3) Displaying data using tables, pictographs, and bar graphs

Exhibit 7.10: Teachers Feel "Very Well" Prepared to Teach TIMSS Mathematics Topics

TIMSS 2011 Mathematics 8th Grade

Reported by Teachers

Country	Percent of Students Whose Teachers Feel "Very Well" Prepared to Teach TIMSS Mathematics Topics									
	Overall Mathematics (19 Topics)		Number (5 Topics)		Algebra (5 Topics)		Geometry (6 Topics)		Data and Chance (3 Topics)	
Armenia		93 (0.8)		98 (0.7)		98 (0.5)		95 (1.0)		72 (2.7)
Australia	r	91 (1.6)	r	93 (1.7)	r	92 (1.6)	r	91 (1.8)	r	86 (2.6)
Bahrain		88 (1.0)		93 (1.0)		91 (0.9)		88 (1.1)		74 (2.7)
Chile		84 (2.1)		94 (2.0)		79 (2.6)		83 (2.4)		77 (3.2)
Chinese Taipei		72 (1.9)		90 (2.2)		84 (2.7)		80 (2.5)		8 (2.3)
England		94 (1.4)		97 (1.3)		94 (1.7)		94 (1.5)		92 (2.0)
Finland		84 (1.0)		95 (0.8)		94 (1.0)		90 (1.6)		33 (3.2)
Georgia		94 (0.9)		99 (0.7)		97 (0.9)		95 (1.0)		76 (2.8)
Ghana		87 (1.6)		95 (1.2)		89 (1.8)		84 (2.4)		75 (2.5)
Hong Kong SAR		82 (1.9)		91 (1.9)		87 (2.2)		84 (2.4)		52 (3.9)
Hungary		86 (1.6)		94 (1.6)		88 (1.7)		89 (1.7)		64 (2.5)
Indonesia		54 (2.6)		63 (4.2)		66 (4.1)		59 (3.2)		10 (2.3)
Iran, Islamic Rep. of		82 (1.1)		93 (1.1)		87 (1.2)		86 (1.7)		47 (2.3)
Israel		93 (0.8)		95 (1.0)		96 (0.9)		91 (1.0)		90 (1.3)
Italy		64 (2.8)		73 (3.3)		61 (3.0)		68 (3.0)		48 (3.2)
Japan		67 (2.7)		79 (3.3)		69 (3.3)		74 (3.3)		32 (2.9)
Jordan		84 (1.6)		92 (1.8)		92 (1.6)		87 (1.9)		51 (3.6)
Kazakhstan		– –		– –		– –		– –		– –
Korea, Rep. of		79 (1.3)		88 (1.4)		86 (1.5)		82 (1.9)		46 (2.0)
Lebanon		81 (1.9)		91 (1.7)		89 (2.1)		79 (2.3)		53 (3.6)
Lithuania		93 (0.7)		99 (0.6)		97 (0.8)		95 (1.0)		72 (2.2)
Macedonia, Rep. of	r	93 (1.1)	r	98 (1.1)	s	97 (1.2)	r	96 (1.0)	r	74 (3.1)
Malaysia		83 (1.7)		93 (1.5)		85 (2.2)		85 (2.2)		60 (2.4)
Morocco		75 (1.7)		88 (1.8)		78 (2.3)		78 (2.4)		44 (2.5)
New Zealand		89 (1.4)		92 (1.7)		90 (1.8)		88 (1.6)		84 (1.7)
Norway		85 (1.9)		91 (2.2)		85 (2.4)		86 (2.0)		71 (2.9)
Oman		87 (1.0)		96 (0.6)		91 (1.4)		88 (1.2)		64 (2.6)
Palestinian Nat'l Auth.		86 (1.6)		91 (1.7)		85 (2.0)		86 (2.1)		77 (2.7)
Qatar		96 (0.6)		99 (0.5)		97 (0.7)		96 (0.8)		87 (1.4)
Romania		94 (0.7)		99 (0.5)		96 (0.9)		96 (0.9)		76 (2.6)
Russian Federation		– –		– –		– –		– –		– –
Saudi Arabia		88 (1.1)		92 (1.1)		91 (1.2)		89 (1.4)		75 (3.1)
Singapore		86 (1.1)		96 (1.0)		90 (1.4)		85 (1.5)		66 (1.9)
Slovenia		88 (0.8)		97 (0.8)		92 (1.1)		95 (1.0)		56 (2.1)
Sweden	r	87 (1.2)	r	96 (1.0)	r	89 (1.9)	r	85 (1.6)	r	73 (2.6)
Syrian Arab Republic		79 (1.9)		86 (2.2)		84 (2.5)		80 (2.6)		59 (3.5)
Thailand		55 (2.5)		73 (2.5)		45 (3.7)		59 (3.1)		37 (3.8)
Tunisia		78 (1.7)		90 (1.6)		75 (2.5)		82 (1.9)		54 (3.1)
Turkey		85 (1.5)		94 (1.4)		86 (2.0)		83 (1.9)		72 (2.3)
Ukraine		72 (2.7)		86 (3.0)		80 (3.2)		78 (3.3)		22 (2.7)
United Arab Emirates		90 (0.7)		96 (0.6)		93 (0.9)		91 (0.9)		73 (1.6)
United States	r	94 (0.6)	r	98 (0.4)	r	96 (0.7)	r	93 (0.9)	r	83 (1.6)
International Avg.		84 (0.3)		92 (0.3)		87 (0.3)		85 (0.3)		62 (0.4)

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (–) indicates comparable data not available.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 7.10: Teachers Feel "Very Well" Prepared to Teach TIMSS Mathematics Topics (Continued)

Country	Percent of Students Whose Teachers Feel "Very Well" Prepared to Teach TIMSS Mathematics Topics									
	Overall Mathematics (19 Topics)		Number (5 Topics)		Algebra (5 Topics)		Geometry (6 Topics)		Data and Chance (3 Topics)	
Ninth Grade Participants										
Botswana		86 (1.6)		93 (1.8)		89 (2.1)		89 (2.0)		65 (2.9)
Honduras	r	82 (2.0)	r	95 (1.7)	r	88 (2.5)	r	78 (3.0)	r	58 (3.8)
South Africa		88 (1.3)		93 (1.6)		92 (1.5)		85 (1.9)		80 (2.2)
Benchmarking Participants										
Alberta, Canada		92 (1.9)		95 (1.8)		93 (2.1)		90 (2.3)		91 (2.0)
Ontario, Canada		85 (1.8)		92 (1.5)		83 (2.5)		84 (2.0)		83 (2.5)
Quebec, Canada		90 (1.2)		97 (1.1)		93 (1.4)		94 (1.3)		69 (3.0)
Abu Dhabi, UAE		89 (1.8)		96 (1.3)		92 (2.2)		90 (2.3)		73 (3.0)
Dubai, UAE		92 (0.7)		98 (0.5)		96 (0.5)		95 (1.7)		70 (1.7)
Alabama, US	r	92 (1.4)	r	94 (1.8)	r	94 (1.6)	r	93 (1.5)	r	87 (3.4)
California, US	s	88 (2.2)	s	97 (1.8)	s	94 (3.0)	s	87 (4.0)	s	66 (5.0)
Colorado, US	r	88 (2.6)	r	93 (2.1)	r	91 (2.6)	r	84 (3.3)	r	80 (4.2)
Connecticut, US		96 (0.9)		100 (0.2)		97 (0.8)		97 (1.0)		89 (3.6)
Florida, US	s	97 (0.8)	s	100 (0.3)	s	99 (0.7)	s	98 (1.0)	s	88 (3.1)
Indiana, US	r	93 (2.0)	r	97 (1.5)	r	96 (1.4)	r	92 (2.7)	r	83 (4.5)
Massachusetts, US		97 (0.7)		99 (0.7)		99 (0.7)		98 (1.2)		92 (2.4)
Minnesota, US	r	91 (2.0)	r	97 (1.5)	r	96 (1.7)	r	90 (3.1)	r	74 (5.1)
North Carolina, US	r	95 (1.4)	r	98 (1.3)	r	98 (1.2)	r	95 (2.0)	r	83 (3.1)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

TIMSS 2011 Mathematics Topics

A. Number

1) Computing, estimating, or approximating with whole numbers
2) Concepts of fractions and computing with fractions
3) Concepts of decimals and computing with decimals
4) Representing, comparing, ordering, and computing with integers
5) Problem solving involving percents and proportions

B. Algebra

1) Numeric, algebraic, and geometric patterns or sequences
2) Simplifying and evaluating algebraic expressions
3) Simple linear equations and inequalities
4) Simultaneous (two variables) equations
5) Representation of functions as ordered pairs, tables, graphs, words, or equations

C. Geometry

1) Geometric properties of angles and geometric shapes
2) Congruent figures and similar triangles
3) Relationship between three-dimensional shapes and their two-dimensional representations
4) Using appropriate measurement formulas for perimeters, circumferences, areas, surface areas, and volumes
5) Points on the Cartesian plane
6) Translation, reflection, and rotation

D. Data and Chance

1) Reading and displaying data using tables, pictographs, bar graphs, pie charts, and line graphs
2) Interpreting data sets
3) Judging, predicting, and determining the chances of possible outcomes

Teachers' Confidence in Teaching Mathematics

Teachers with a strong sense of personal ability to organize and execute their teaching are more open to new ideas and less likely to experience emotional burnout. Research has shown that teachers' self-confidence in their teaching skills is not only associated with their professional behavior, but also with students' performance and motivation (Bandura, 1997; Henson, 2002).

To investigate teachers' confidence in teaching mathematics to the TIMSS class, teachers were asked to indicate how confident they feel about doing each of the following:

- Answer students' questions about mathematics;
- Show students a variety of problem solving strategies;
- Provide challenging tasks for capable students;
- Adapt my teaching to engage students' interest; and
- Help students appreciate the value of learning mathematics.

Exhibit 7.11 shows the fourth grade TIMSS assessment results for the Confidence in Teaching Mathematics scale. Students were scored according to their teachers' responses with **Very Confident** teachers being "very confident" in using three of the five instructional strategies and "somewhat confident" in using the other two, on average. All other teachers were considered to be **Somewhat Confident**. On average internationally, the majority of fourth grade students (75%) had teachers **Very Confident** in teaching mathematics to the class, and their mathematics achievement was somewhat higher on average than the 25 percent of students whose teachers were only **Somewhat Confident** (492 vs. 487). Across countries, the percentage of students taught by **Very Confident** teachers varied widely, from 21 to 99 percent.

Exhibit 7.12 provides further information about the components of the Confidence in Teaching Mathematics scale, by showing the percentage of students whose teachers reported feeling very confident in using each of the five instructional strategies. On average across countries at the fourth grade, teachers were most often very confident about answering student questions about mathematics (84% of students taught by such teachers) and showing students a variety of problem solving strategies (75%), and less often very confident about helping students appreciate the value of learning mathematics (69%), adapting teaching to engage student interests (65%), and providing challenging tasks for capable students (59%).

Exhibit 7.13 shows results for the Confidence in Teaching Mathematics scale for the eighth grade TIMSS assessment. On average, the results were very similar to the fourth grade, although the achievement difference between students with **Very Confident** teachers and **Somewhat Confident** teachers was slightly larger (14 points vs. 5 points). Again, the percentage of students taught by **Very Confident** teachers varied widely, from 36 to 99 percent. Also, as shown in Exhibit 7.14, the components of the Confidence in Teaching Mathematics scale at the eighth grade followed a similar pattern in terms of teacher confidence as at the fourth grade, with teachers most often very confident about answering student questions about mathematics (87% of students taught by such teachers) and showing students a variety of problem solving strategies (77%) and less often very confident about the other components.

Exhibit 7.11: Confidence in Teaching Mathematics

TIMSS 2011 Mathematics 4th Grade

Reported by Teachers

Students were scored according to their teachers' responses to how confident they felt in using five instructional strategies on the *Confidence in Teaching Mathematics* scale. Students with **Very Confident** teachers had a score on the scale of at least 9.2, which corresponds to their teachers being "very confident" in using three of the five instructional strategies and "somewhat confident" in using the other two, on average. All other students had **Somewhat Confident** teachers.

Country	Very Confident		Somewhat Confident		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Romania	99 (0.5)	481 (5.9)	1 (0.5)	~ ~	11.6 (0.05)
Kazakhstan	99 (0.8)	503 (4.4)	1 (0.8)	~ ~	11.7 (0.07)
Russian Federation	97 (1.2)	542 (3.7)	3 (1.2)	542 (22.1)	11.4 (0.06)
Georgia	95 (1.6)	450 (3.9)	5 (1.6)	483 (22.9)	11.0 (0.10)
Portugal	92 (2.3)	533 (3.9)	8 (2.3)	526 (6.5)	11.2 (0.12)
Azerbaijan	91 (2.2)	463 (6.4)	9 (2.2)	476 (13.2)	10.8 (0.11)
Poland	90 (2.1)	482 (2.1)	10 (2.1)	473 (8.4)	10.7 (0.10)
Serbia	89 (2.6)	517 (3.3)	11 (2.6)	507 (10.4)	10.8 (0.13)
Chile r	89 (2.5)	463 (3.4)	11 (2.5)	446 (13.1)	10.9 (0.14)
United Arab Emirates	89 (1.4)	439 (2.2)	11 (1.4)	412 (9.8)	10.6 (0.07)
Croatia	88 (2.1)	489 (2.1)	12 (2.1)	501 (5.0)	10.5 (0.10)
Armenia	87 (2.2)	455 (3.9)	13 (2.2)	430 (8.1)	10.4 (0.12)
Lithuania	87 (2.5)	536 (2.5)	13 (2.5)	517 (9.6)	10.8 (0.14)
Qatar	85 (2.6)	418 (4.2)	15 (2.6)	379 (14.6)	10.5 (0.12)
United States r	84 (1.8)	543 (2.2)	16 (1.8)	539 (5.9)	10.6 (0.09)
Spain	84 (3.1)	484 (3.4)	16 (3.1)	475 (6.1)	10.6 (0.12)
Malta	84 (0.1)	496 (1.5)	16 (0.1)	497 (3.3)	10.5 (0.00)
Hungary	83 (2.7)	515 (4.2)	17 (2.7)	512 (9.2)	10.5 (0.14)
Norway	82 (3.5)	496 (3.3)	18 (3.5)	487 (5.0)	10.3 (0.15)
Oman	81 (2.6)	390 (3.1)	19 (2.6)	364 (7.7)	10.3 (0.10)
Saudi Arabia	80 (3.6)	409 (6.4)	20 (3.6)	408 (9.5)	10.1 (0.15)
Netherlands r	79 (3.4)	539 (2.3)	21 (3.4)	539 (4.1)	9.9 (0.14)
Slovenia	78 (2.8)	514 (2.1)	22 (2.8)	509 (6.1)	10.0 (0.12)
Northern Ireland r	78 (3.6)	562 (3.4)	22 (3.6)	565 (8.5)	10.3 (0.16)
Australia r	76 (3.0)	524 (4.0)	24 (3.0)	509 (6.0)	10.2 (0.14)
Bahrain	76 (3.1)	441 (4.1)	24 (3.1)	423 (4.1)	10.0 (0.16)
Belgium (Flemish)	74 (3.0)	550 (2.1)	26 (3.0)	548 (4.0)	9.9 (0.14)
Ireland	74 (3.2)	529 (2.9)	26 (3.2)	523 (6.5)	10.0 (0.14)
England	73 (4.3)	546 (4.3)	27 (4.3)	540 (7.5)	10.0 (0.16)
Slovak Republic	72 (3.1)	509 (4.3)	28 (3.1)	501 (6.5)	9.7 (0.14)
Austria	72 (2.7)	506 (2.7)	28 (2.7)	514 (4.8)	9.8 (0.11)
Kuwait	72 (3.9)	341 (4.5)	28 (3.9)	344 (6.6)	9.8 (0.14)
Singapore	71 (2.3)	605 (4.1)	29 (2.3)	608 (5.2)	10.0 (0.11)
Chinese Taipei	71 (3.4)	593 (2.3)	29 (3.4)	587 (4.8)	9.7 (0.15)
Tunisia	71 (4.1)	362 (4.5)	29 (4.1)	353 (6.9)	9.5 (0.18)
Sweden r	71 (4.4)	506 (3.0)	29 (4.4)	505 (4.9)	10.0 (0.16)
Denmark r	70 (3.9)	540 (3.1)	30 (3.9)	540 (5.1)	9.9 (0.15)
Turkey	66 (2.9)	474 (6.3)	34 (2.9)	460 (8.1)	9.6 (0.13)
Yemen	64 (4.4)	247 (7.8)	36 (4.4)	252 (9.5)	9.4 (0.16)
Czech Republic	63 (3.7)	511 (3.4)	37 (3.7)	511 (4.0)	9.3 (0.16)
New Zealand	63 (3.0)	485 (3.9)	37 (3.0)	486 (3.7)	9.5 (0.13)
Morocco r	62 (4.5)	339 (5.6)	38 (4.5)	337 (9.3)	9.3 (0.16)
Finland	62 (3.3)	549 (2.6)	38 (3.3)	542 (3.2)	9.2 (0.14)
Germany	61 (3.1)	529 (2.9)	39 (3.1)	527 (3.7)	9.2 (0.15)
Iran, Islamic Rep. of	57 (3.8)	436 (4.4)	43 (3.8)	423 (5.8)	9.0 (0.13)
Korea, Rep. of	48 (4.3)	606 (2.7)	52 (4.3)	603 (2.9)	8.6 (0.18)
Hong Kong SAR	48 (4.6)	598 (6.5)	52 (4.6)	606 (3.9)	8.7 (0.18)
Thailand	47 (4.6)	467 (6.8)	53 (4.6)	450 (6.9)	8.3 (0.18)
Italy	45 (3.5)	511 (4.3)	55 (3.5)	508 (3.1)	8.4 (0.17)
Japan	21 (2.9)	584 (3.7)	79 (2.9)	586 (1.9)	7.3 (0.14)
International Avg.	75 (0.4)	492 (0.6)	25 (0.4)	487 (1.2)	

Centerpoint of scale set at 10.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 7.11: Confidence in Teaching Mathematics (Continued)

Country	Very Confident		Somewhat Confident		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Sixth Grade Participants					
Honduras	94 (1.9)	395 (6.2)	6 (1.9)	393 (14.2)	11.2 (0.11)
Botswana r	85 (3.2)	419 (4.5)	15 (3.2)	420 (9.0)	10.6 (0.15)
Yemen	60 (4.4)	343 (7.2)	40 (4.4)	355 (9.2)	9.3 (0.15)
Benchmarking Participants					
Dubai, UAE	95 (1.4)	474 (2.6)	5 (1.4)	448 (20.8)	11.1 (0.08)
Abu Dhabi, UAE	90 (2.5)	421 (4.8)	10 (2.5)	408 (18.7)	10.6 (0.15)
Florida, US r	85 (3.3)	543 (4.1)	15 (3.3)	551 (9.4)	10.8 (0.16)
North Carolina, US	81 (4.7)	555 (4.7)	19 (4.7)	547 (9.5)	10.2 (0.18)
Alberta, Canada r	79 (3.7)	509 (2.9)	21 (3.7)	497 (7.6)	10.2 (0.18)
Quebec, Canada	78 (3.5)	532 (2.8)	22 (3.5)	535 (4.6)	10.1 (0.17)
Ontario, Canada	74 (3.4)	520 (3.5)	26 (3.4)	516 (4.8)	10.1 (0.15)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

In teaching mathematics to this class, how confident do you feel to do the following?

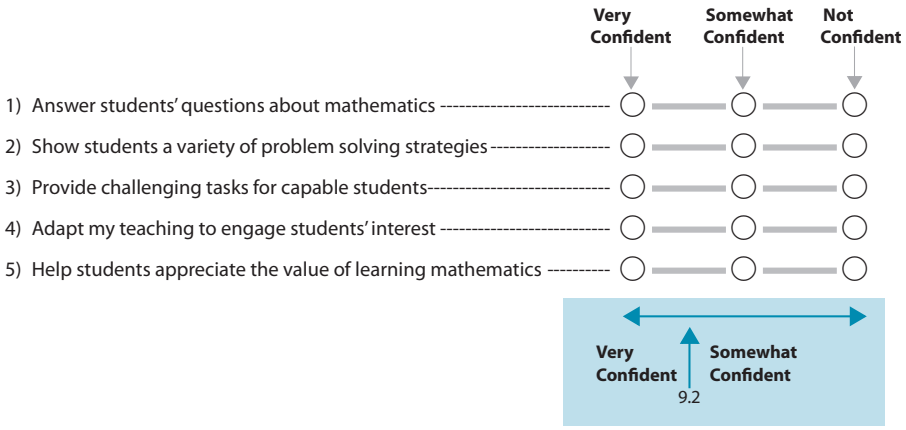


Exhibit 7.12: Components of Confidence in Teaching Mathematics Scale

TIMSS 2011 Mathematics 4th Grade

Reported by Teachers

Country	Percent of Students Whose Teachers Feel Very Confident to									
	Answer Student Questions About Mathematics		Show Students a Variety of Problem Solving Strategies		Provide Challenging Tasks for Capable Students		Adapt Teaching to Engage Student Interests		Help Students Appreciate the Value of Learning Mathematics	
Armenia		88 (2.6)		91 (2.0)		68 (3.2)		66 (3.7)		77 (3.4)
Australia	r	86 (2.1)	r	83 (2.3)	r	67 (3.7)	r	63 (4.1)	r	65 (3.8)
Austria		90 (2.1)		80 (2.5)		58 (3.4)		48 (3.4)		59 (3.4)
Azerbaijan		96 (1.6)		76 (3.1)		76 (3.6)		80 (2.4)		89 (2.4)
Bahrain		76 (3.5)		67 (3.4)		65 (4.1)		71 (3.6)		75 (3.8)
Belgium (Flemish)		90 (2.0)		79 (3.1)		45 (3.8)		66 (3.6)		63 (3.8)
Chile	r	92 (2.4)	r	80 (3.2)	r	80 (3.4)	r	81 (3.2)	r	88 (2.8)
Chinese Taipei		87 (2.7)		79 (3.2)		57 (3.9)		57 (3.8)		46 (3.8)
Croatia		89 (2.0)		76 (3.2)		65 (3.1)		81 (2.4)		86 (2.5)
Czech Republic		74 (3.9)		71 (3.1)		52 (3.9)		42 (3.8)		58 (4.0)
Denmark	r	93 (2.2)	r	80 (3.2)	r	52 (4.3)	r	55 (4.1)	r	61 (4.3)
England		85 (3.3)		76 (3.8)		59 (4.5)		70 (3.9)		65 (4.0)
Finland		77 (3.0)		66 (3.0)		46 (3.7)		44 (3.3)		55 (3.6)
Georgia		89 (2.2)		92 (2.1)		73 (3.4)		81 (2.9)		95 (1.6)
Germany		82 (2.5)		67 (3.5)		51 (3.5)		41 (3.4)		48 (3.5)
Hong Kong SAR		79 (3.4)		62 (4.2)		37 (4.3)		38 (4.3)		31 (4.2)
Hungary		88 (2.4)		82 (2.8)		69 (3.3)		75 (3.5)		76 (2.9)
Iran, Islamic Rep. of		67 (3.3)		45 (3.9)		36 (3.6)		57 (3.3)		68 (3.9)
Ireland		92 (2.1)		70 (3.1)		63 (4.0)		63 (3.2)		61 (3.6)
Italy		42 (3.6)		52 (3.1)		32 (3.2)		48 (4.0)		51 (3.5)
Japan		50 (4.2)		31 (3.2)		14 (2.6)		19 (2.8)		22 (3.0)
Kazakhstan		98 (1.1)		99 (0.9)		97 (1.3)		92 (2.3)		98 (1.1)
Korea, Rep. of		73 (3.6)		46 (4.1)		34 (4.2)		44 (4.3)		42 (4.2)
Kuwait		75 (3.6)		63 (4.0)		50 (3.7)		74 (3.7)		77 (3.5)
Lithuania		90 (2.4)		90 (2.5)		76 (3.4)		77 (3.3)		83 (2.3)
Malta		93 (0.1)		85 (0.1)		63 (0.1)		78 (0.1)		75 (0.1)
Morocco	r	60 (3.8)	r	61 (3.8)	r	42 (4.3)	r	61 (4.0)	r	71 (3.9)
Netherlands	r	92 (2.7)	r	86 (3.3)	r	42 (4.8)	r	57 (3.9)	r	73 (3.9)
New Zealand		77 (2.9)		71 (2.9)		51 (3.3)		56 (3.2)		58 (3.1)
Northern Ireland	r	89 (2.9)	r	80 (4.0)	r	70 (4.3)	r	72 (4.1)	r	69 (4.2)
Norway		97 (1.3)		89 (2.6)		63 (4.2)		56 (4.3)		75 (4.4)
Oman		89 (2.3)		76 (2.5)		66 (2.8)		71 (2.6)		75 (2.6)
Poland		94 (1.9)		90 (1.8)		65 (3.5)		70 (3.4)		89 (2.2)
Portugal		96 (1.6)		93 (1.9)		81 (2.9)		87 (2.9)		84 (2.9)
Qatar		84 (1.8)		81 (2.5)		65 (3.6)		84 (2.7)		77 (3.5)
Romania		100 (0.0)		95 (1.4)		96 (1.4)		95 (1.6)		94 (1.6)
Russian Federation		98 (1.0)		98 (0.9)		89 (2.2)		83 (2.4)		97 (1.2)
Saudi Arabia		81 (3.4)		77 (3.6)		57 (4.3)		74 (3.7)		73 (3.8)
Serbia		90 (2.3)		87 (2.8)		77 (3.3)		78 (3.2)		86 (2.9)
Singapore		89 (1.6)		78 (2.1)		64 (2.6)		61 (2.8)		55 (2.9)
Slovak Republic		83 (2.5)		71 (2.9)		61 (3.4)		65 (3.3)		54 (3.5)
Slovenia		87 (2.6)		72 (3.0)		52 (3.4)		68 (3.0)		73 (3.3)
Spain		98 (0.8)		87 (2.4)		68 (3.3)		71 (3.6)		79 (3.5)
Sweden	r	92 (2.3)	r	86 (3.0)	r	59 (4.6)	r	54 (4.4)	r	63 (4.2)
Thailand		62 (4.4)		54 (4.3)		31 (4.4)		36 (4.1)		39 (4.4)
Tunisia		71 (4.0)		68 (4.2)		44 (4.5)		68 (4.3)		67 (3.8)
Turkey		64 (2.9)		59 (3.3)		58 (3.2)		73 (2.4)		64 (3.0)
United Arab Emirates		88 (1.5)		79 (2.0)		69 (2.6)		83 (1.6)		85 (1.6)
United States	r	93 (1.2)	r	83 (2.0)	r	69 (2.9)	r	74 (2.0)	r	78 (2.2)
Yemen		76 (3.3)		64 (4.2)		44 (4.3)		56 (4.5)		71 (3.7)
International Avg.		84 (0.4)		75 (0.4)		59 (0.5)		65 (0.5)		69 (0.5)

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 7.12: Components of Confidence in Teaching Mathematics Scale (Continued)

Country	Percent of Students Whose Teachers Feel Very Confident to				
	Answer Student Questions About Mathematics	Show Students a Variety of Problem Solving Strategies	Provide Challenging Tasks for Capable Students	Adapt Teaching to Engage Student Interests	Help Students Appreciate the Value of Learning Mathematics
Sixth Grade Participants					
Botswana	r 89 (3.1)	r 81 (3.7)	r 72 (3.9)	r 74 (4.0)	r 87 (3.1)
Honduras	90 (2.5)	90 (2.4)	84 (3.4)	88 (3.0)	98 (1.2)
Yemen	74 (3.6)	64 (4.2)	39 (4.4)	48 (4.5)	69 (4.1)
Benchmarking Participants					
Alberta, Canada	r 88 (2.7)	r 80 (3.5)	r 60 (4.4)	r 70 (3.9)	r 71 (4.3)
Ontario, Canada	88 (2.4)	80 (2.9)	58 (3.5)	66 (3.5)	67 (3.3)
Quebec, Canada	87 (3.0)	78 (3.6)	61 (3.9)	61 (4.3)	73 (3.8)
Abu Dhabi, UAE	88 (3.0)	83 (3.2)	69 (4.1)	83 (3.3)	84 (3.5)
Dubai, UAE	94 (1.9)	88 (1.9)	79 (2.4)	89 (1.8)	91 (1.4)
Florida, US	r 93 (2.2)	r 88 (3.1)	r 74 (4.2)	s 78 (4.3)	r 81 (4.1)
North Carolina, US	89 (2.3)	85 (4.9)	r 59 (5.4)	68 (5.6)	71 (4.2)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 7.13: Confidence in Teaching Mathematics

TIMSS 2011 Mathematics 8th Grade

Reported by Teachers

Students were scored according to their teachers' responses to how confident they felt in using five instructional strategies on the *Confidence in Teaching Mathematics* scale. Students with **Very Confident** teachers had a score on the scale of at least 9.2, which corresponds to their teachers being "very confident" in using three of the five instructional strategies and "somewhat confident" in using the other two, on average. All other students had **Somewhat Confident** teachers.

Country	Very Confident		Somewhat Confident		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Kazakhstan	99 (0.8)	487 (4.1)	1 (0.8)	~ ~	11.5 (0.07)
Ukraine	99 (0.7)	479 (3.8)	1 (0.7)	~ ~	11.4 (0.10)
Russian Federation	97 (1.0)	540 (3.7)	3 (1.0)	514 (16.6)	11.4 (0.07)
Lithuania	96 (1.4)	503 (2.8)	4 (1.4)	497 (12.8)	11.1 (0.09)
Macedonia, Rep. of r	95 (1.7)	427 (6.6)	5 (1.7)	385 (25.5)	11.1 (0.11)
Romania	95 (1.9)	461 (4.0)	5 (1.9)	411 (25.1)	11.2 (0.11)
Chile	95 (1.8)	418 (3.0)	5 (1.8)	405 (11.4)	11.0 (0.10)
Ghana	93 (2.1)	329 (4.5)	7 (2.1)	358 (20.0)	11.2 (0.11)
Slovenia	92 (1.5)	505 (2.3)	8 (1.5)	509 (6.1)	10.7 (0.08)
Indonesia	90 (2.5)	387 (4.6)	10 (2.5)	377 (14.8)	10.7 (0.14)
United States r	86 (2.0)	514 (3.7)	14 (2.0)	503 (6.7)	10.6 (0.09)
Israel	86 (1.9)	523 (4.5)	14 (1.9)	496 (10.8)	10.9 (0.09)
Qatar	85 (2.9)	419 (4.7)	15 (2.9)	358 (13.6)	10.6 (0.14)
England	84 (3.2)	509 (5.9)	16 (3.2)	489 (14.9)	10.5 (0.15)
Georgia	83 (3.1)	431 (4.7)	17 (3.1)	429 (9.4)	10.3 (0.13)
Armenia	81 (3.1)	471 (3.3)	19 (3.1)	444 (8.5)	10.2 (0.13)
United Arab Emirates	81 (1.7)	463 (2.5)	19 (1.7)	423 (4.2)	10.4 (0.08)
Oman	81 (2.4)	370 (2.9)	19 (2.4)	349 (7.7)	10.1 (0.11)
Lebanon	80 (3.5)	455 (4.3)	20 (3.5)	433 (8.4)	10.2 (0.14)
Australia r	78 (3.4)	507 (5.8)	22 (3.4)	513 (11.3)	10.2 (0.15)
Hungary	78 (3.0)	505 (3.8)	22 (3.0)	501 (7.5)	10.1 (0.12)
Sweden r	78 (2.7)	486 (2.5)	22 (2.7)	487 (4.0)	10.0 (0.11)
Malaysia	77 (3.2)	446 (6.1)	23 (3.2)	422 (11.8)	10.1 (0.17)
Norway	76 (3.9)	474 (2.8)	24 (3.9)	481 (4.0)	9.9 (0.15)
Saudi Arabia	73 (3.3)	402 (5.6)	27 (3.3)	376 (6.3)	9.9 (0.15)
New Zealand	73 (2.5)	489 (5.8)	27 (2.5)	489 (13.5)	10.0 (0.10)
Bahrain	73 (2.6)	421 (2.5)	27 (2.6)	388 (4.2)	9.9 (0.11)
Chinese Taipei	69 (3.5)	615 (4.6)	31 (3.5)	597 (6.5)	9.4 (0.15)
Palestinian Nat'l Auth.	69 (4.0)	409 (4.7)	31 (4.0)	394 (7.4)	9.5 (0.17)
Finland	69 (3.4)	514 (3.1)	31 (3.4)	514 (3.2)	9.6 (0.13)
Syrian Arab Republic	67 (4.1)	380 (5.4)	33 (4.1)	376 (8.2)	9.4 (0.18)
Morocco	66 (3.1)	375 (2.7)	34 (3.1)	365 (3.8)	9.4 (0.14)
Jordan	66 (3.4)	408 (4.5)	34 (3.4)	401 (6.0)	9.2 (0.14)
Turkey	65 (3.3)	461 (4.9)	35 (3.3)	436 (5.6)	9.3 (0.15)
Tunisia	61 (4.1)	422 (3.4)	39 (4.1)	428 (5.0)	9.3 (0.17)
Singapore	59 (2.8)	603 (5.5)	41 (2.8)	623 (5.2)	9.1 (0.12)
Hong Kong SAR	56 (4.7)	583 (6.6)	44 (4.7)	590 (8.2)	8.9 (0.17)
Iran, Islamic Rep. of	55 (3.3)	421 (7.0)	45 (3.3)	407 (6.5)	8.9 (0.14)
Italy	51 (3.7)	501 (3.6)	49 (3.7)	498 (4.1)	8.4 (0.17)
Korea, Rep. of	50 (3.3)	613 (4.2)	50 (3.3)	613 (4.4)	8.6 (0.15)
Thailand	39 (4.1)	445 (8.3)	61 (4.1)	415 (6.0)	8.4 (0.17)
Japan	36 (3.9)	577 (5.5)	64 (3.9)	566 (3.7)	8.0 (0.17)
International Avg.	76 (0.5)	470 (0.7)	24 (0.5)	456 (1.7)	

Centerpoint of scale set at 10.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 7.13: Confidence in Teaching Mathematics (Continued)

Country		Very Confident		Somewhat Confident		Average Scale Score
		Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Ninth Grade Participants						
Honduras	r	97 (1.6)	337 (4.5)	3 (1.6)	361 (30.0)	11.1 (0.11)
Botswana		89 (2.8)	399 (2.8)	11 (2.8)	377 (7.4)	10.6 (0.15)
South Africa		89 (2.7)	354 (3.3)	11 (2.7)	336 (11.0)	10.8 (0.15)
Benchmarking Participants						
North Carolina, US	r	92 (4.2)	538 (6.4)	8 (4.2)	539 (38.4)	10.9 (0.21)
Florida, US	r	92 (3.1)	521 (7.7)	8 (3.1)	484 (15.1)	10.9 (0.16)
Massachusetts, US	r	92 (4.0)	558 (6.6)	8 (4.0)	584 (13.0)	10.8 (0.19)
California, US	s	89 (3.4)	497 (6.9)	11 (3.4)	472 (15.1)	10.4 (0.19)
Minnesota, US	r	87 (4.6)	549 (5.3)	13 (4.6)	524 (22.5)	10.5 (0.17)
Alabama, US	s	87 (4.1)	472 (9.2)	13 (4.1)	441 (13.4)	10.7 (0.19)
Connecticut, US	r	87 (4.3)	531 (6.1)	13 (4.3)	482 (18.4)	10.6 (0.17)
Dubai, UAE		86 (1.7)	486 (3.0)	14 (1.7)	414 (7.4)	10.7 (0.12)
Alberta, Canada		80 (3.3)	506 (3.2)	20 (3.3)	498 (5.3)	10.2 (0.15)
Indiana, US	r	80 (5.7)	521 (6.3)	20 (5.7)	502 (9.0)	10.3 (0.21)
Colorado, US	r	79 (4.6)	523 (6.0)	21 (4.6)	498 (16.8)	10.2 (0.21)
Abu Dhabi, UAE		77 (3.6)	458 (4.8)	23 (3.6)	422 (6.6)	10.4 (0.15)
Ontario, Canada		74 (3.8)	514 (3.0)	26 (3.8)	510 (5.0)	9.9 (0.18)
Quebec, Canada		73 (3.4)	536 (3.0)	27 (3.4)	523 (5.8)	9.9 (0.13)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

In teaching mathematics to this class, how confident do you feel to do the following?

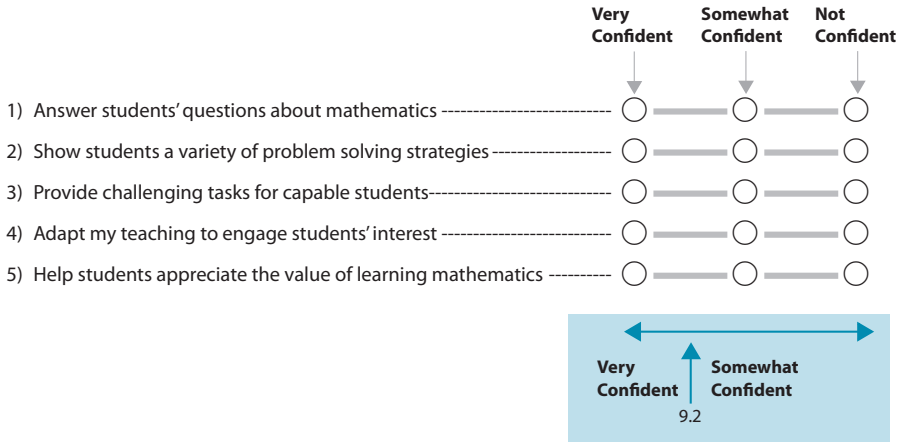


Exhibit 7.14: Components of Confidence in Teaching Mathematics Scale

TIMSS 2011 Mathematics 8th Grade

Reported by Teachers

Country	Percent of Students Whose Teachers Feel Very Confident to				
	Answer Student Questions About Mathematics	Show Students a Variety of Problem Solving Strategies	Provide Challenging Tasks for Capable Students	Adapt Teaching to Engage Student Interests	Help Students Appreciate the Value of Learning Mathematics
Armenia	95 (1.6)	86 (2.5)	61 (3.9)	55 (3.6)	72 (3.1)
Australia	r 95 (1.4)	r 80 (3.2)	r 70 (3.4)	r 63 (4.2)	r 62 (3.7)
Bahrain	84 (2.9)	66 (2.6)	63 (2.9)	68 (2.6)	68 (3.1)
Chile	97 (1.4)	88 (2.6)	81 (3.3)	73 (3.5)	92 (1.9)
Chinese Taipei	88 (2.5)	81 (3.2)	65 (3.7)	44 (4.0)	34 (4.1)
England	97 (1.3)	87 (3.0)	83 (3.3)	62 (3.9)	61 (4.2)
Finland	93 (2.1)	84 (2.8)	63 (3.6)	40 (3.8)	48 (3.5)
Georgia	89 (2.4)	87 (2.8)	64 (3.4)	65 (3.6)	77 (3.1)
Ghana	94 (2.0)	91 (2.2)	77 (3.5)	90 (2.3)	92 (2.0)
Hong Kong SAR	90 (2.8)	73 (3.9)	45 (4.5)	33 (4.2)	28 (4.0)
Hungary	95 (1.6)	85 (2.6)	64 (3.2)	58 (3.5)	58 (3.5)
Indonesia	95 (1.9)	79 (4.7)	69 (4.4)	80 (3.0)	87 (2.9)
Iran, Islamic Rep. of	66 (3.3)	43 (3.8)	44 (3.4)	57 (4.0)	57 (3.2)
Israel	96 (1.0)	91 (1.2)	75 (2.4)	80 (2.3)	77 (2.6)
Italy	63 (3.6)	60 (3.7)	47 (3.8)	35 (3.7)	32 (3.5)
Japan	74 (3.4)	46 (4.2)	36 (4.0)	27 (3.8)	21 (3.0)
Jordan	69 (3.3)	60 (3.5)	54 (3.8)	55 (4.1)	61 (3.8)
Kazakhstan	100 (0.0)	99 (0.9)	87 (2.9)	88 (2.6)	96 (1.4)
Korea, Rep. of	72 (2.6)	55 (3.3)	46 (3.2)	36 (3.0)	36 (3.3)
Lebanon	89 (2.4)	78 (3.3)	62 (4.2)	71 (3.9)	73 (3.4)
Lithuania	98 (0.9)	99 (0.8)	92 (1.7)	74 (3.4)	77 (3.0)
Macedonia, Rep. of	r 91 (2.6)	s 80 (3.4)	r 85 (3.5)	r 90 (2.5)	r 94 (2.3)
Malaysia	88 (2.4)	80 (3.1)	62 (3.8)	63 (3.8)	72 (3.4)
Morocco	69 (3.5)	61 (3.1)	49 (3.5)	61 (3.3)	66 (3.2)
New Zealand	91 (2.0)	77 (2.4)	70 (2.5)	58 (3.0)	56 (3.3)
Norway	94 (2.0)	79 (3.5)	70 (3.9)	37 (4.1)	64 (4.1)
Oman	90 (1.7)	69 (3.1)	63 (3.1)	67 (3.0)	74 (2.9)
Palestinian Nat'l Auth.	75 (3.9)	68 (3.9)	56 (4.3)	64 (4.1)	59 (4.2)
Qatar	90 (2.5)	86 (2.9)	70 (3.5)	79 (3.0)	75 (3.3)
Romania	96 (1.4)	94 (2.0)	87 (2.6)	90 (2.5)	82 (3.2)
Russian Federation	99 (0.7)	98 (1.0)	85 (2.4)	83 (2.4)	93 (1.4)
Saudi Arabia	84 (3.3)	63 (4.3)	59 (3.6)	68 (3.9)	76 (3.3)
Singapore	89 (1.8)	71 (2.5)	51 (3.1)	41 (2.9)	35 (2.7)
Slovenia	97 (0.8)	90 (1.7)	82 (2.4)	68 (2.3)	72 (2.9)
Sweden	r 96 (1.6)	r 92 (2.0)	r 68 (3.0)	r 44 (3.8)	r 54 (3.7)
Syrian Arab Republic	74 (3.8)	51 (4.5)	53 (4.4)	64 (4.2)	66 (4.1)
Thailand	72 (3.5)	61 (4.1)	26 (3.7)	37 (3.9)	34 (4.2)
Tunisia	80 (3.2)	62 (3.9)	39 (3.4)	56 (4.0)	64 (3.9)
Turkey	69 (3.5)	64 (3.1)	55 (3.6)	62 (3.2)	57 (3.4)
Ukraine	100 (0.0)	98 (1.3)	90 (2.6)	82 (3.7)	92 (2.5)
United Arab Emirates	86 (1.7)	79 (2.0)	68 (2.0)	75 (2.2)	78 (1.9)
United States	r 97 (0.8)	r 91 (1.6)	r 76 (2.3)	r 65 (2.6)	r 67 (2.5)
International Avg.	87 (0.4)	77 (0.5)	65 (0.5)	62 (0.5)	65 (0.5)

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 7.14: Components of Confidence in Teaching Mathematics Scale (Continued)

Country	Percent of Students Whose Teachers Feel Very Confident to				
	Answer Students Questions About Mathematics	Show Students a Variety of Problem Solving Strategies	Provide Challenging Tasks for Capable Students	Adapt Teaching to Engage Student Interests	Help Students Appreciate the Value of Learning Mathematics
Ninth Grade Participants					
Botswana	96 (1.6)	84 (3.1)	72 (4.3)	64 (4.5)	87 (3.0)
Honduras	r 93 (2.7)	r 93 (2.7)	r 70 (4.6)	r 89 (3.1)	r 96 (1.6)
South Africa	95 (1.7)	86 (3.0)	70 (3.9)	79 (3.3)	86 (2.7)
Benchmarking Participants					
Alberta, Canada	93 (2.2)	87 (2.8)	72 (3.6)	57 (3.9)	63 (3.7)
Ontario, Canada	86 (2.9)	76 (3.7)	65 (4.3)	60 (3.8)	63 (3.9)
Quebec, Canada	96 (1.4)	84 (3.0)	55 (4.1)	52 (3.5)	60 (3.5)
Abu Dhabi, UAE	85 (3.5)	81 (3.4)	65 (3.7)	72 (3.9)	77 (3.5)
Dubai, UAE	88 (1.1)	82 (3.4)	80 (2.3)	80 (4.0)	80 (2.2)
Alabama, US	s 97 (2.2)	s 98 (1.9)	s 77 (5.7)	s 63 (5.5)	s 70 (7.7)
California, US	s 98 (1.5)	s 93 (2.7)	s 80 (5.6)	s 58 (6.9)	s 56 (5.8)
Colorado, US	r 96 (2.1)	r 92 (3.5)	r 72 (5.2)	r 53 (6.4)	r 58 (6.5)
Connecticut, US	r 100 (0.0)	r 93 (2.8)	r 79 (4.3)	r 58 (5.0)	r 70 (5.7)
Florida, US	r 100 (0.4)	s 91 (4.3)	r 80 (5.8)	r 76 (5.0)	r 78 (5.7)
Indiana, US	r 100 (0.0)	r 92 (3.2)	r 70 (6.6)	r 58 (6.3)	r 61 (5.7)
Massachusetts, US	r 99 (1.2)	r 92 (4.0)	r 84 (4.2)	r 62 (6.0)	r 75 (5.3)
Minnesota, US	r 99 (1.3)	r 92 (3.7)	r 81 (4.0)	r 58 (5.5)	r 65 (5.1)
North Carolina, US	r 98 (2.1)	r 94 (3.9)	r 87 (4.9)	r 69 (4.9)	r 76 (6.0)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Teachers' Career Satisfaction

Teachers who are satisfied with their profession and the working conditions at their school are more motivated to teach and prepare their instruction. Further, having teachers that can provide leadership is a dimension of teacher quality. However, developing master teachers requires retention in the profession. Teachers need to be committed to the profession and like it enough to continue teaching. It may be that some subject areas and locales would benefit from policies to reduce teacher attrition in order to improve student achievement (Boyd, Grossman, Lankford, Loeb, & Wyckoff, 2009).

Exhibit 7.15 shows the fourth grade TIMSS assessment results for the TIMSS 2011 Teacher Career Satisfaction scale, based on how much teachers agreed with each of the following six statements:

- I am content with my profession as a teacher;
- I am satisfied with being a teacher at this school;
- I had more enthusiasm when I began teaching than I have now (reverse coded);
- I do important work as a teacher;
- I plan to continue as a teacher for as long as I can; and,
- I am frustrated as a teacher (reverse coded).

Students were scored according to their teachers responses, with **Satisfied** teachers "agreeing a lot" with three of the six statements and "agreeing a little" with the other three, on average. Internationally, on average, the majority of fourth grade students (54%) had teachers **Satisfied** with their careers. Another 41 percent of the students, on average, had teachers that reported being **Somewhat Satisfied** (mostly agreed "a little" instead of "a lot"). Although satisfaction could be relative and dependent on the teaching situation, very few fourth grade students had mathematics teachers expressing any dissatisfaction except in a small number of countries.

The Teacher Career Satisfaction scale was positively related to average mathematics achievement. On average, mathematics achievement was higher for the fourth grade students of Satisfied teachers than for students of **Somewhat Satisfied** or **Less Than Satisfied** teachers. However, looking across the countries at the fourth grade, sixth grade, and benchmarking participants, it is clear that there are differences from country to country. In particular, it is noteworthy that four of the highest achieving countries in mathematics at the fourth grade—Chinese Taipei, Singapore, Japan, and Korea—had among the lowest percentages of students taught by **Satisfied** teachers, but that there was no relationship between teacher satisfaction and mathematics achievement in these countries.

As shown in Exhibit 7.16, the eighth grade mathematics teachers reported somewhat lower levels of career satisfaction than the fourth grade teachers, with 47 percent of students taught by **Satisfied** teachers (compared to 54% at the fourth grade). However, taken together, almost all of the eighth grade students (92%) were taught mathematics by **Satisfied** or **Somewhat Satisfied** teachers. Similar to the fourth grade situation, on average, students taught by Satisfied teachers had higher mathematics achievement than those taught by less satisfied teachers (473 vs. 464 and 462).

Exhibit 7.15: Teacher Career Satisfaction

TIMSS 2011 4th Grade Mathematics

Reported by Teachers

Students were scored according to their teachers' degree of agreement with six statements on the *Teacher Career Satisfaction* scale. Students with **Satisfied** teachers had a score on the scale of at least 10.1, which corresponds to their teachers "agreeing a lot" with three of the six statements and "agreeing a little" with the other three, on average. Students with **Less Than Satisfied** teachers had a score no higher than 6.6, which corresponds to their teachers "disagreeing a little" with three of the six statements and "agreeing a little" with the other three, on average. All other students had **Somewhat Satisfied** teachers.

Country	Satisfied		Somewhat Satisfied		Less Than Satisfied		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Croatia	83 (2.7)	489 (2.1)	16 (2.5)	495 (5.2)	1 (0.9)	~ ~	11.1 (0.11)
Georgia	79 (3.3)	451 (4.1)	20 (3.2)	451 (7.0)	1 (0.6)	~ ~	11.3 (0.14)
Chile	79 (2.9)	463 (3.2)	18 (2.6)	454 (7.2)	3 (1.2)	460 (10.7)	11.2 (0.14)
Armenia	77 (3.0)	450 (4.1)	21 (2.9)	458 (6.7)	1 (0.7)	~ ~	11.1 (0.13)
Denmark	70 (3.6)	542 (2.8)	27 (3.6)	531 (5.4)	3 (1.3)	547 (8.0)	10.6 (0.15)
Thailand	69 (3.6)	457 (4.7)	31 (3.6)	461 (11.4)	0 (0.0)	~ ~	10.1 (0.11)
Spain	69 (4.0)	491 (3.2)	27 (3.7)	464 (4.7)	4 (1.6)	460 (11.8)	11.0 (0.19)
Malta	69 (0.1)	502 (1.6)	28 (0.1)	484 (2.6)	3 (0.1)	486 (9.0)	10.9 (0.01)
Ireland	68 (3.4)	526 (3.1)	29 (3.4)	532 (6.9)	2 (0.8)	~ ~	10.9 (0.12)
United Arab Emirates	66 (2.0)	442 (3.1)	29 (2.0)	423 (4.7)	5 (1.0)	411 (10.8)	10.5 (0.09)
Iran, Islamic Rep. of	66 (3.3)	435 (4.8)	31 (3.5)	423 (6.1)	3 (1.1)	431 (24.5)	10.4 (0.11)
Qatar	64 (4.0)	411 (5.9)	33 (3.8)	419 (10.1)	3 (1.3)	384 (30.0)	10.5 (0.14)
Poland	64 (3.0)	479 (2.6)	36 (3.0)	485 (3.5)	1 (0.5)	~ ~	10.6 (0.11)
Turkey	62 (3.4)	482 (5.2)	34 (3.4)	451 (9.2)	4 (1.5)	431 (11.2)	10.4 (0.14)
Belgium (Flemish)	62 (3.6)	550 (2.1)	34 (3.3)	548 (3.5)	4 (1.2)	545 (12.6)	10.3 (0.14)
Azerbaijan	62 (3.5)	465 (6.8)	37 (3.4)	461 (8.3)	1 (0.5)	~ ~	10.2 (0.10)
Kazakhstan	60 (3.4)	510 (6.0)	39 (3.3)	489 (8.5)	1 (0.4)	~ ~	10.2 (0.10)
Russian Federation	60 (3.0)	542 (4.3)	36 (2.9)	542 (5.2)	4 (1.2)	533 (5.2)	10.2 (0.13)
Austria	59 (3.6)	511 (3.0)	36 (3.6)	506 (4.4)	5 (1.5)	500 (11.7)	10.4 (0.14)
Saudi Arabia	59 (4.1)	417 (7.6)	38 (4.1)	402 (6.8)	3 (1.2)	368 (14.4)	10.3 (0.15)
Serbia	59 (4.3)	518 (3.7)	38 (4.2)	512 (5.4)	3 (1.4)	526 (20.2)	10.2 (0.15)
Kuwait	58 (3.6)	342 (4.6)	36 (3.6)	340 (5.9)	6 (1.9)	350 (10.3)	10.1 (0.14)
Romania	57 (4.2)	487 (8.1)	42 (4.3)	473 (7.6)	1 (0.6)	~ ~	10.5 (0.14)
Lithuania	56 (3.8)	536 (3.5)	41 (3.8)	531 (4.8)	3 (1.0)	519 (14.1)	10.2 (0.13)
Hungary	56 (3.5)	525 (4.2)	41 (3.5)	504 (6.2)	3 (1.0)	470 (10.7)	10.0 (0.13)
Australia r	56 (4.0)	528 (4.4)	37 (3.8)	509 (5.4)	7 (1.7)	505 (13.8)	10.0 (0.17)
Northern Ireland r	56 (4.3)	564 (4.2)	41 (4.6)	562 (6.8)	4 (1.5)	562 (12.0)	10.3 (0.18)
Slovak Republic	54 (3.2)	504 (5.2)	40 (3.0)	508 (4.7)	7 (1.7)	519 (9.7)	9.8 (0.13)
England	53 (3.9)	549 (4.8)	36 (3.6)	543 (7.0)	11 (2.8)	527 (12.6)	9.9 (0.19)
Tunisia	52 (4.2)	366 (4.7)	42 (3.9)	355 (6.4)	6 (1.9)	327 (18.5)	9.9 (0.15)
Bahrain	49 (4.3)	449 (6.1)	38 (4.7)	421 (6.0)	13 (2.9)	432 (6.2)	9.6 (0.19)
Germany	49 (3.2)	530 (3.2)	44 (3.4)	526 (3.0)	7 (1.8)	528 (4.9)	9.9 (0.13)
Yemen	49 (4.0)	252 (8.8)	47 (4.1)	238 (8.8)	4 (1.4)	274 (39.5)	9.6 (0.12)
New Zealand	48 (3.0)	487 (4.2)	45 (2.9)	488 (3.7)	7 (1.5)	472 (11.2)	9.9 (0.14)
United States r	47 (2.6)	541 (2.8)	46 (2.7)	546 (3.2)	8 (1.4)	525 (8.1)	9.8 (0.11)
Norway	46 (3.7)	499 (3.5)	43 (3.8)	490 (5.2)	11 (2.7)	492 (7.8)	9.7 (0.17)
Hong Kong SAR	46 (4.4)	605 (4.0)	46 (4.3)	596 (5.0)	8 (2.6)	624 (10.6)	9.4 (0.15)
Oman	45 (2.7)	396 (3.8)	45 (2.7)	378 (4.0)	10 (1.7)	366 (9.7)	9.5 (0.10)
Czech Republic	45 (3.6)	518 (3.7)	48 (4.1)	505 (3.9)	8 (2.2)	502 (5.7)	9.6 (0.14)
Slovenia	44 (3.0)	514 (3.1)	53 (3.2)	512 (3.3)	3 (0.9)	515 (10.4)	9.6 (0.08)
Finland	41 (3.1)	552 (3.2)	51 (3.5)	542 (2.9)	8 (2.3)	537 (7.0)	9.4 (0.13)
Netherlands r	40 (4.5)	539 (4.2)	53 (4.6)	540 (2.9)	7 (2.6)	532 (9.0)	9.4 (0.18)
Italy	38 (3.7)	515 (4.1)	53 (3.7)	504 (4.3)	9 (2.4)	506 (9.4)	9.3 (0.14)
Portugal	36 (4.0)	537 (5.2)	59 (4.3)	530 (4.9)	5 (1.8)	526 (10.9)	9.5 (0.19)
Morocco	33 (3.1)	361 (7.9)	58 (3.1)	326 (6.5)	9 (2.3)	338 (14.7)	9.0 (0.15)
Chinese Taipei	31 (3.9)	591 (3.6)	64 (4.0)	591 (2.5)	5 (0.9)	590 (6.9)	9.0 (0.11)
Sweden r	30 (3.3)	501 (4.4)	58 (3.7)	506 (3.1)	12 (3.1)	508 (8.4)	9.0 (0.16)
Singapore	29 (2.8)	609 (6.3)	59 (3.0)	604 (4.3)	12 (1.8)	605 (11.9)	8.8 (0.11)
Japan	28 (3.7)	588 (3.9)	58 (4.2)	586 (2.3)	15 (2.8)	581 (3.9)	8.7 (0.14)
Korea, Rep. of	19 (3.3)	602 (3.6)	69 (4.1)	607 (2.7)	11 (2.9)	598 (5.3)	8.3 (0.13)
International Avg.	54 (0.5)	494 (0.7)	41 (0.5)	487 (0.8)	5 (0.2)	486 (2.1)	

Centerpoint of scale set at 10.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

TIMSS & PIRLS International Study Center
Lynch School of Education, Boston College

Exhibit 7.15: Teacher Career Satisfaction (Continued)

Country	Satisfied		Somewhat Satisfied		Less Than Satisfied		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Sixth Grade Participants							
Honduras	95 (1.8)	397 (6.0)	5 (1.8)	387 (18.8)	0 (0.0)	~ ~	12.2 (0.13)
Yemen	44 (3.9)	342 (8.7)	52 (3.8)	353 (7.0)	4 (1.8)	346 (38.6)	9.6 (0.12)
Botswana	27 (4.0)	433 (8.7)	59 (4.1)	416 (5.4)	13 (2.9)	415 (8.3)	8.6 (0.15)
Benchmarking Participants							
Dubai, UAE	69 (1.7)	480 (2.8)	29 (1.8)	448 (6.5)	2 (0.6)	~ ~	10.7 (0.09)
Abu Dhabi, UAE	65 (3.8)	425 (6.6)	30 (3.8)	405 (7.3)	4 (1.4)	399 (21.1)	10.6 (0.15)
Alberta, Canada r	59 (4.3)	514 (3.6)	40 (4.3)	498 (3.8)	1 (0.8)	~ ~	10.2 (0.15)
Ontario, Canada	58 (3.7)	519 (3.7)	39 (3.5)	518 (4.6)	3 (1.2)	521 (10.6)	10.2 (0.13)
Quebec, Canada	40 (3.6)	539 (4.0)	50 (4.1)	527 (3.1)	10 (2.8)	535 (5.8)	9.5 (0.15)
Florida, US r	38 (4.9)	543 (6.7)	54 (5.2)	543 (5.2)	8 (2.9)	547 (13.4)	9.7 (0.19)
North Carolina, US	35 (5.8)	559 (6.1)	58 (5.0)	551 (6.0)	6 (2.2)	539 (5.5)	9.3 (0.24)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

How much do you agree with the following statements?

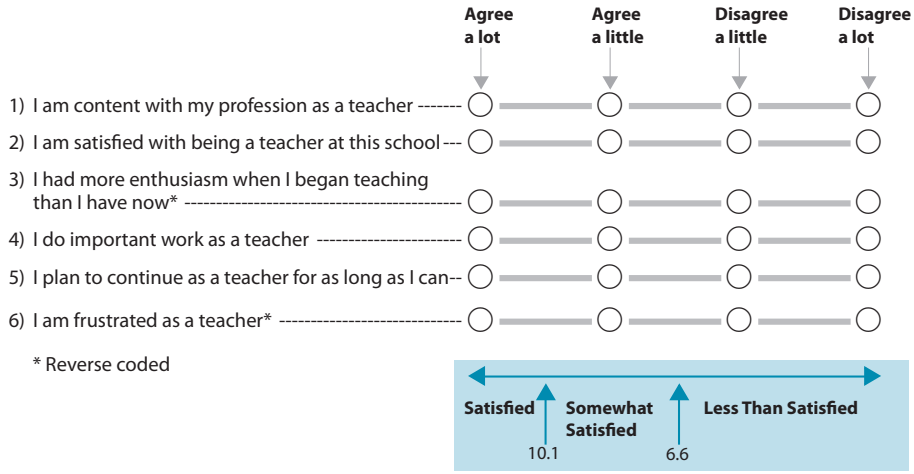


Exhibit 7.16: Teacher Career Satisfaction

TIMSS 2011 8th Grade Mathematics

Reported by Teachers

Students were scored according to their teachers' degree of agreement with six statements on the *Teacher Career Satisfaction* scale. Students with **Satisfied** teachers had a score on the scale of at least 10.4, which corresponds to their teachers "agreeing a lot" with three of the six statements and "agreeing a little" with the other three, on average. Students with **Less Than Satisfied** teachers had a score no higher than 7.0, which corresponds to their teachers "disagreeing a little" with three of the six statements and "agreeing a little" with the other three, on average. All other students had **Somewhat Satisfied** teachers.

Country	Satisfied		Somewhat Satisfied		Less Than Satisfied		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Chile	72 (3.8)	418 (3.8)	26 (3.7)	415 (7.3)	2 (1.2)	~ ~	11.2 (0.15)
Armenia	69 (3.5)	467 (3.7)	29 (3.5)	464 (7.6)	2 (0.9)	~ ~	11.0 (0.13)
Thailand	69 (4.0)	425 (5.7)	31 (4.0)	431 (9.8)	0 (0.0)	~ ~	10.5 (0.08)
Israel	69 (2.6)	524 (5.1)	28 (2.6)	508 (9.7)	3 (0.9)	503 (24.0)	11.1 (0.11)
Qatar	66 (3.5)	421 (5.2)	31 (3.2)	387 (7.0)	3 (1.4)	395 (17.6)	10.9 (0.18)
Georgia	65 (3.9)	431 (5.8)	32 (3.6)	430 (7.5)	3 (1.3)	438 (10.0)	10.9 (0.15)
Ukraine	63 (4.1)	484 (5.6)	35 (3.9)	471 (5.6)	1 (1.0)	~ ~	10.5 (0.12)
Syrian Arab Republic	62 (4.6)	382 (6.0)	35 (4.4)	370 (8.5)	3 (1.5)	402 (24.4)	10.8 (0.18)
Malaysia	61 (4.3)	441 (6.6)	38 (4.4)	439 (9.1)	0 (0.0)	~ ~	10.4 (0.13)
Indonesia	59 (4.5)	387 (6.3)	41 (4.5)	384 (6.9)	0 (0.0)	~ ~	10.6 (0.17)
United Arab Emirates	58 (2.4)	462 (3.5)	39 (2.4)	448 (3.7)	4 (0.8)	424 (7.4)	10.7 (0.09)
Norway	57 (4.1)	480 (3.0)	38 (4.1)	468 (3.8)	5 (1.9)	474 (6.4)	10.3 (0.17)
Romania	57 (3.9)	458 (5.5)	40 (3.8)	457 (7.8)	4 (1.3)	453 (9.3)	10.4 (0.14)
Kazakhstan	55 (3.6)	497 (5.9)	44 (3.6)	475 (6.1)	1 (0.4)	~ ~	10.3 (0.11)
Saudi Arabia	54 (3.8)	401 (6.5)	37 (3.9)	394 (6.4)	9 (2.0)	363 (8.7)	10.1 (0.15)
Iran, Islamic Rep. of	51 (3.5)	419 (7.0)	42 (3.8)	414 (5.2)	7 (1.7)	390 (12.2)	10.2 (0.12)
Turkey	50 (3.7)	466 (5.5)	40 (3.4)	440 (6.0)	9 (1.9)	432 (12.9)	10.0 (0.16)
New Zealand	49 (4.2)	495 (8.3)	41 (3.9)	483 (7.8)	10 (2.2)	479 (16.0)	9.9 (0.16)
United States r	48 (2.4)	515 (5.0)	43 (2.4)	510 (4.5)	9 (1.3)	503 (10.4)	10.1 (0.11)
Tunisia	48 (4.0)	426 (5.1)	47 (3.8)	423 (4.5)	5 (1.8)	432 (12.7)	10.0 (0.15)
England	46 (4.0)	513 (8.0)	44 (3.9)	507 (9.1)	10 (2.8)	466 (20.3)	10.1 (0.19)
Lithuania	45 (3.5)	503 (5.3)	47 (3.6)	504 (4.5)	8 (1.7)	490 (7.3)	10.0 (0.14)
Russian Federation	45 (3.6)	544 (4.5)	51 (3.5)	535 (5.6)	4 (1.4)	540 (14.9)	10.0 (0.11)
Macedonia, Rep. of r	44 (3.9)	430 (10.4)	51 (4.0)	416 (7.4)	5 (1.9)	444 (39.9)	10.2 (0.15)
Hungary	42 (3.7)	502 (5.9)	52 (3.8)	506 (5.6)	6 (1.6)	506 (8.7)	9.9 (0.13)
Italy	42 (3.9)	497 (4.5)	49 (3.9)	500 (3.9)	9 (2.2)	504 (12.4)	9.7 (0.13)
Hong Kong SAR	42 (4.3)	597 (7.0)	52 (4.4)	583 (6.1)	6 (1.8)	547 (25.9)	9.8 (0.15)
Australia r	42 (3.9)	516 (8.3)	43 (3.4)	505 (8.3)	15 (2.8)	487 (13.8)	9.8 (0.18)
Palestinian Nat'l Auth.	41 (3.9)	403 (5.2)	54 (4.2)	404 (5.3)	5 (1.8)	414 (15.1)	9.9 (0.14)
Bahrain	41 (2.1)	437 (4.4)	46 (2.9)	392 (4.1)	13 (2.3)	386 (6.4)	9.9 (0.11)
Finland	41 (3.9)	516 (4.0)	50 (3.9)	513 (3.2)	10 (2.4)	513 (5.9)	9.7 (0.15)
Oman	36 (3.1)	383 (4.9)	52 (3.2)	363 (4.4)	12 (2.1)	326 (7.0)	9.5 (0.12)
Morocco	36 (3.2)	381 (4.5)	49 (3.7)	365 (3.0)	15 (2.2)	368 (3.2)	9.5 (0.11)
Slovenia	36 (2.9)	503 (3.5)	59 (2.8)	506 (2.9)	6 (1.2)	495 (5.2)	9.7 (0.11)
Lebanon	34 (4.0)	448 (6.8)	61 (4.1)	453 (4.9)	6 (2.1)	427 (19.1)	9.9 (0.16)
Chinese Taipei	33 (4.0)	611 (7.8)	57 (3.9)	610 (5.2)	10 (2.4)	602 (7.3)	9.4 (0.13)
Jordan	31 (3.4)	415 (5.9)	52 (3.4)	403 (6.0)	18 (2.8)	399 (10.5)	9.2 (0.15)
Sweden r	31 (3.5)	492 (3.6)	52 (3.5)	484 (3.4)	17 (2.7)	481 (4.7)	9.2 (0.16)
Ghana	30 (3.5)	334 (8.0)	58 (4.0)	328 (6.1)	13 (2.6)	339 (11.0)	9.4 (0.13)
Singapore	29 (2.5)	634 (6.7)	62 (2.5)	603 (5.3)	9 (1.5)	597 (9.6)	9.2 (0.10)
Japan	25 (3.0)	588 (5.6)	63 (3.6)	566 (3.7)	12 (2.5)	552 (5.8)	9.1 (0.15)
Korea, Rep. of	11 (1.8)	610 (8.9)	67 (2.9)	616 (3.5)	22 (2.7)	602 (6.9)	8.2 (0.09)
International Avg.	47 (0.6)	473 (0.9)	45 (0.6)	464 (1.0)	7 (0.3)	462 (2.4)	

Centerpoint of scale set at 10.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

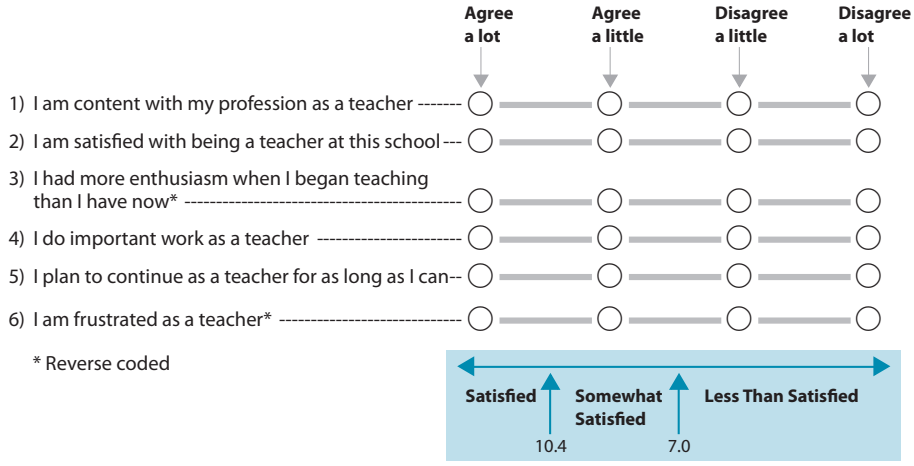
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Exhibit 7.16: Teacher Career Satisfaction (Continued)

Country	Satisfied		Somewhat Satisfied		Less Than Satisfied		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Ninth Grade Participants							
Honduras	86 (3.5)	333 (4.5)	14 (3.5)	365 (11.9)	0 (0.0)	~ ~	12.3 (0.15)
South Africa	42 (3.4)	351 (5.2)	48 (3.7)	357 (4.7)	10 (2.3)	332 (5.4)	9.7 (0.12)
Botswana	15 (3.0)	408 (8.6)	65 (4.1)	394 (3.2)	21 (3.7)	398 (7.6)	8.6 (0.14)
Benchmarking Participants							
Dubai, UAE	65 (3.6)	483 (3.5)	32 (3.5)	469 (7.3)	3 (0.4)	392 (11.7)	11.1 (0.14)
Ontario, Canada	58 (3.9)	516 (3.0)	39 (3.9)	508 (4.4)	2 (1.0)	~ ~	10.4 (0.16)
Connecticut, US	55 (5.7)	523 (7.7)	37 (5.5)	516 (12.3)	9 (4.2)	523 (22.1)	10.3 (0.23)
Massachusetts, US	53 (6.4)	555 (7.5)	43 (6.2)	566 (8.8)	4 (1.7)	544 (15.6)	10.3 (0.24)
Colorado, US r	52 (7.4)	529 (9.0)	37 (6.6)	509 (13.3)	10 (3.7)	497 (23.4)	10.0 (0.27)
California, US r	52 (6.4)	493 (10.6)	42 (6.1)	494 (9.0)	7 (3.3)	480 (15.8)	10.3 (0.22)
Abu Dhabi, UAE	51 (3.8)	454 (6.3)	44 (4.2)	447 (6.4)	5 (1.9)	434 (12.0)	10.4 (0.15)
Alberta, Canada	49 (3.6)	507 (4.4)	46 (3.5)	502 (3.0)	5 (1.7)	515 (8.8)	10.4 (0.17)
Quebec, Canada	46 (4.7)	537 (4.3)	45 (4.4)	528 (4.0)	8 (2.2)	530 (8.0)	10.0 (0.21)
Indiana, US r	45 (6.7)	524 (10.0)	41 (7.0)	505 (7.2)	14 (5.3)	542 (14.1)	9.8 (0.29)
Alabama, US r	39 (7.3)	477 (14.0)	45 (9.0)	458 (9.7)	16 (6.5)	471 (15.9)	9.7 (0.33)
North Carolina, US r	36 (6.7)	532 (9.1)	55 (6.9)	549 (12.3)	9 (4.0)	539 (17.9)	9.7 (0.28)
Minnesota, US	35 (6.3)	555 (9.6)	57 (6.1)	542 (8.8)	8 (3.5)	528 (14.9)	9.7 (0.22)
Florida, US r	22 (5.8)	552 (13.8)	58 (6.3)	516 (10.7)	20 (4.9)	489 (14.7)	9.1 (0.30)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

How much do you agree with the following statements?



Chapter 8



Classroom Instruction

Overall, students with positive attitudes toward mathematics have higher achievement, but these attitudes deteriorate over time. Internationally, by the eighth grade, only about one-fourth like learning mathematics (compared to nearly half at the fourth grade) and only 14 percent are confident in their abilities (compared to one-third).

Engaging instruction as well as good nutrition and enough sleep were related to higher achievement. However, by the eighth grade, only one-quarter of the students reported being engaged in their mathematics lessons, and nearly as many reported being not engaged. Also, in the majority of eighth grade classrooms, instruction was limited because students were suffering from lack of sleep.

This chapter considers the learning environment of the classroom itself, because classroom instruction is at the core of student learning. Previous chapters of this report have described how teaching effectiveness can be greatly influenced by students' home and school environments as well as by the teacher's preparation. However, even though the curricular policies and school resources often set the tone for accomplishment, students' day-to-day classroom activities are likely to have a considerable direct impact on their mathematics learning.

TIMSS routinely presents very powerful evidence showing that, within countries, students with more positive attitudes toward mathematics have substantially higher achievement, and the results from TIMSS 2011 are consistent with previous assessments. In addition to being motivated to learn, students need the opportunity to learn. Thus, this chapter also provides information about the instructional time devoted to mathematics and the approaches teachers use to engage students in learning. It is difficult, however, for teachers to engage students in learning, for example, if students do not have the prerequisite skills or are too sleep deprived or disruptive to pay attention. Finally, an effective classroom environment for mathematics learning involves using a variety of instructional approaches, capitalizing on technology, and at the eighth grade, extending instruction with homework and regularly assessing student progress.

Students' Attitudes Toward Mathematics

Each successive TIMSS assessment has shown a strong positive relationship within countries between student attitudes toward mathematics and their mathematics achievement. Additionally, there is extensive research showing that students with more positive attitudes toward mathematics and science have higher average achievement in mathematics and science. For example, a recent meta-analysis of student attitudes toward school found that attitudes toward mathematics or science were related to mathematics and science achievement across 288 studies (Hattie, 2009). While positive attitudes and high achievement in mathematics go hand in hand, it should be understood that the relationship is bidirectional, with attitudes and achievement mutually influencing each other. Students who are good at mathematics also are more likely to enjoy learning mathematics.

Much research about students' attitudes toward learning has studied the complex phenomenon of motivation. For example, students' motivation to learn can be affected by whether they find the subject enjoyable and place value on the

subject. In addition, students' motivation can be affected by their self-confidence in learning the subject. TIMSS 2011 included scales about three motivational constructs: intrinsic value (interest), utility value, and ability beliefs. Essentially, intrinsic motivation refers to doing an activity because it is interesting or enjoyable, and the Students Like Learning Mathematics scale was developed to measure students' interest and liking of learning mathematics. In contrast, extrinsic motivation refers to doing something because it leads to a desirable outcome. There are many types of external motivation from teacher praise, to good grades, to being accepted to a good university, to having a successful career and daily life. In particular, the TIMSS 2011 Students Value Mathematics scale addresses students' attitudes about the importance of the subject and usefulness of the subject, sometimes called attainment value and utility value (Wigfield & Eccles, 2000). Finally, motivation to learn includes having the feeling that you can succeed. The Student Confidence with Mathematics scale assesses students' self-confidence or self-concept in their ability to learn mathematics. A strong self-concept encourages students to engage with the instruction and show persistence, effort, and attentiveness.

Students Like Learning Mathematics

Exhibit 8.1 presents the fourth grade results for the TIMSS 2011 Students Like Learning Mathematics scale. Students were scored according to the degree of their agreement with five statements such as "I enjoy learning mathematics," "Mathematics is boring" (reverse coded), and "I learn many interesting things in mathematics" (see second page of the exhibit for details). Students in the **Like Learning Mathematics** category "agreed a lot" with three of the five statements and "agreed a little" with the other two, on average. In contrast, students who **Do Not Like Learning Mathematics** "disagreed a little" with three of the statements and "agreed a little" with the other two, on average.

For each TIMSS 2011 participant, the percentage of students in each category is shown together with the students' average mathematics achievement. The first page of the exhibit presents the results for countries participating at the fourth grade, and the average results across those countries. The second page of the exhibit presents the results for the sixth grade and benchmarking participants.

On average, nearly half of the fourth grade students internationally **Like Learning Mathematics**, substantially more than **Do Not Like Learning Mathematics** (48% vs. 16%). The remaining fourth grade students (36%, on

average) **Somewhat Like Learning Mathematics**. Looking across countries, some of the highest performing countries have the smallest percentages of students reporting positive attitudes toward learning mathematics, such as Chinese Taipei, Japan, and Korea. The tendency of smaller percentages of students in some East Asian countries to report positive attitudes is consistent with previous TIMSS assessments. The relatively low percentages of students who like learning mathematics may partially result from the high level of difficulty of the mathematics being studied, and also these countries have a cultural tradition of serious attitudes toward learning.

Most important, however, on average internationally, and in almost all TIMSS 2011 countries, including the sixth grade and benchmarking participants, students who liked learning mathematics had higher average mathematics achievement than those who only somewhat liked learning mathematics. In particular, those students who reported not liking learning mathematics had the lowest average mathematics achievement.

Exhibit 8.2 presents the corresponding results for the eighth grade on the Students Like Learning Mathematics scale. The first page of the exhibit presents the results for countries participating at the eighth grade, and the average results across those countries. The second page of the exhibit presents the results for the ninth grade and benchmarking participants.

Compared to the fourth grade, substantially fewer eighth grade students reported positive attitudes toward learning mathematics. By the eighth grade, more students reported an emerging dislike for learning mathematics than reported liking it, and the drop in positive attitudes between fourth and eighth grade occurred across countries. Only about one-fourth of the students, internationally, on average, **Like Learning Mathematics**, and another 42 percent **Somewhat Like Learning Mathematics**. Nearly one-third (31%) **Do Not Like Learning Mathematics**. The pattern of achievement in relation to attitudes mirrored that of the younger students, with a direct relationship between the two. Increasingly, more positive attitudes toward learning mathematics were associated with progressively higher average mathematics achievement. This pattern held generally across the ninth grade and benchmarking participants.

Students Value Mathematics

Exhibit 8.3 presents the results for the TIMSS 2011 Students Value Mathematics scale, which only was given at the eighth grade. The scale itself addresses six different aspects of valuing mathematics:

- I think learning mathematics will help me in my daily life;
- I need mathematics to learn other school subjects;
- I need to do well in mathematics to get into the university of my choice;
- I need to do well in mathematics to get the job I want;
- I would like a job that involves using mathematics; and
- It is important to do well in mathematics.

Students with a score corresponding to "agreeing a lot" with three of the statements and "agreeing a little" with the other three, on average, were considered to **Value** mathematics. In comparison, students in the **Do Not Value** mathematics category "disagreed a little" with three of the statements and "agreed a little" with the other three, on average.

Internationally, on average, eighth grade students placed a high value on mathematics. Apparently, even though many eighth grade students do not especially enjoy learning mathematics, they do appreciate the value of the subject; forty-six percent **Value** mathematics and another 39 percent **Somewhat Value** it. Only 15 percent **Do Not Value** the subject. Across the eighth grade, ninth grade, and benchmarking participants, students who said they valued mathematic typically had higher achievement than students who only valued it somewhat, and those students, in turn, had higher achievement than students who did not value mathematics.

Exhibit 8.1: Students Like Learning Mathematics

TIMSS 2011 Mathematics 4th Grade

Reported by Students

Students were scored according to their degree of agreement with five statements on the *Students Like Learning Mathematics* scale. Students who **Like Learning Mathematics** had a score on the scale of at least 10.1, which corresponds to their "agreeing a lot" with three of the five statements and "agreeing a little" with the other two, on average. Students who **Do Not Like Learning Mathematics** had a score no higher than 8.1, which corresponds to their "disagreeing a little" with three of the five statements and "agreeing a little" with the other two, on average. All other students **Somewhat Like Learning Mathematics.**

Country	Like Learning Mathematics		Somewhat Like Learning Mathematics		Do Not Like Learning Mathematics		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Georgia	76 (0.9)	469 (3.2)	20 (0.9)	414 (6.6)	4 (0.3)	401 (11.8)	11.3 (0.03)
Turkey	70 (1.1)	495 (3.2)	26 (0.9)	422 (6.2)	4 (0.4)	394 (15.4)	11.0 (0.04)
Armenia	70 (1.0)	467 (3.5)	24 (0.8)	429 (5.1)	6 (0.5)	395 (7.4)	11.0 (0.04)
Tunisia	69 (1.6)	381 (3.8)	26 (1.5)	320 (5.1)	5 (0.4)	313 (8.1)	11.1 (0.05)
Kazakhstan	66 (1.3)	513 (4.4)	31 (1.2)	484 (5.7)	3 (0.3)	469 (10.7)	10.8 (0.05)
Iran, Islamic Rep. of	63 (1.4)	449 (3.4)	28 (1.0)	398 (4.3)	8 (0.9)	410 (6.7)	10.7 (0.06)
Poland	62 (0.9)	493 (2.5)	28 (0.8)	466 (3.0)	10 (0.5)	459 (4.0)	10.6 (0.03)
Lithuania	58 (1.2)	547 (2.7)	30 (0.8)	521 (2.7)	12 (0.7)	507 (4.9)	10.4 (0.04)
Russian Federation	58 (1.2)	554 (4.0)	34 (1.1)	530 (4.0)	8 (0.6)	514 (6.2)	10.5 (0.04)
Romania	58 (1.4)	510 (5.5)	32 (1.1)	450 (7.6)	10 (0.9)	443 (10.7)	10.5 (0.05)
Saudi Arabia	57 (1.7)	433 (5.7)	33 (1.3)	382 (6.9)	10 (0.7)	377 (9.3)	10.5 (0.07)
Portugal	57 (1.5)	548 (3.9)	34 (1.1)	515 (3.7)	9 (0.9)	502 (5.1)	10.4 (0.06)
United Arab Emirates	56 (0.9)	459 (2.1)	34 (0.7)	405 (2.9)	11 (0.5)	409 (5.5)	10.4 (0.04)
Oman	54 (1.1)	419 (3.2)	39 (1.0)	352 (3.4)	7 (0.5)	329 (5.2)	10.5 (0.04)
Norway	54 (1.7)	502 (3.1)	30 (1.3)	494 (3.7)	16 (1.5)	477 (4.9)	10.2 (0.08)
Malta	51 (0.7)	516 (1.8)	32 (0.8)	480 (2.5)	17 (0.5)	469 (3.7)	10.1 (0.03)
Bahrain	51 (1.7)	461 (3.2)	34 (1.2)	414 (4.2)	15 (0.9)	421 (5.1)	10.2 (0.07)
Italy	50 (1.1)	521 (2.7)	34 (0.7)	500 (3.7)	16 (0.8)	488 (4.2)	10.0 (0.05)
Thailand	50 (1.8)	480 (4.6)	42 (1.6)	441 (5.9)	8 (0.7)	418 (8.6)	10.2 (0.06)
Hungary	48 (1.0)	540 (3.1)	34 (0.7)	497 (4.9)	17 (0.8)	491 (5.1)	10.0 (0.05)
Singapore	48 (0.8)	625 (3.1)	33 (0.6)	597 (3.8)	19 (0.7)	577 (3.8)	9.9 (0.03)
Spain	47 (1.4)	499 (2.6)	35 (0.9)	472 (3.9)	18 (1.0)	465 (4.2)	10.0 (0.07)
Kuwait	47 (1.5)	376 (4.2)	38 (1.2)	320 (4.1)	15 (1.0)	329 (5.5)	10.1 (0.06)
New Zealand	47 (1.1)	491 (3.4)	35 (0.8)	486 (3.0)	18 (0.8)	481 (3.4)	9.9 (0.05)
Hong Kong SAR	47 (1.0)	619 (4.0)	36 (0.8)	591 (3.6)	17 (0.8)	582 (3.7)	9.9 (0.04)
Slovak Republic	45 (1.1)	524 (4.2)	37 (0.8)	499 (3.5)	17 (0.8)	482 (4.7)	9.9 (0.05)
Australia	45 (1.2)	535 (3.5)	33 (0.9)	508 (3.6)	22 (0.9)	495 (3.8)	9.7 (0.05)
Serbia	45 (1.5)	531 (3.8)	37 (1.1)	503 (4.5)	18 (1.1)	507 (4.8)	9.8 (0.07)
Chile	45 (1.1)	485 (2.5)	37 (0.9)	444 (3.0)	18 (0.8)	447 (4.0)	9.9 (0.05)
Sweden	45 (1.2)	508 (2.8)	36 (0.9)	505 (2.6)	19 (1.0)	498 (2.8)	9.8 (0.06)
Morocco	45 (1.7)	371 (4.6)	46 (1.4)	313 (4.5)	10 (0.9)	291 (7.3)	10.2 (0.06)
United States	45 (0.8)	552 (2.3)	33 (0.5)	536 (2.1)	22 (0.8)	531 (2.0)	9.7 (0.04)
Slovenia	45 (1.2)	524 (2.3)	37 (1.0)	507 (3.1)	19 (0.9)	502 (3.5)	9.8 (0.05)
England	44 (1.4)	548 (4.4)	37 (1.1)	543 (4.0)	19 (1.1)	530 (5.5)	9.8 (0.06)
Austria	44 (1.2)	516 (3.6)	33 (0.8)	507 (2.7)	23 (1.1)	496 (3.3)	9.6 (0.06)
Qatar	44 (1.4)	456 (4.2)	41 (1.1)	390 (4.3)	15 (0.8)	387 (7.3)	10.0 (0.06)
Czech Republic	43 (1.1)	523 (3.3)	37 (1.0)	504 (3.0)	19 (1.0)	498 (3.5)	9.8 (0.05)
Germany	42 (0.9)	540 (2.8)	36 (0.8)	527 (3.0)	22 (0.8)	518 (2.8)	9.7 (0.04)
Ireland	41 (1.6)	535 (3.8)	36 (1.0)	529 (3.2)	23 (1.1)	517 (3.3)	9.6 (0.07)
Denmark	37 (1.3)	548 (3.3)	42 (1.0)	537 (2.6)	21 (1.1)	526 (3.7)	9.5 (0.05)
Northern Ireland	36 (1.3)	576 (3.8)	38 (1.0)	564 (3.5)	26 (1.2)	546 (5.6)	9.4 (0.06)
Croatia	34 (0.9)	505 (2.7)	30 (0.8)	487 (2.8)	35 (1.1)	480 (1.9)	9.0 (0.05)
Chinese Taipei	34 (1.1)	613 (2.8)	34 (0.7)	589 (2.6)	32 (1.0)	572 (2.5)	9.2 (0.06)
Finland	34 (1.2)	556 (2.9)	35 (1.0)	548 (3.3)	31 (1.3)	533 (2.6)	9.2 (0.06)
Yemen	34 (2.1)	291 (7.0)	52 (1.9)	239 (6.6)	15 (1.4)	206 (9.6)	9.7 (0.07)
Belgium (Flemish)	33 (1.0)	560 (2.6)	36 (0.8)	551 (2.6)	32 (1.1)	536 (2.4)	9.1 (0.05)
Netherlands	32 (1.1)	550 (2.3)	41 (1.0)	540 (1.9)	26 (1.1)	529 (3.3)	9.2 (0.05)
Japan	29 (1.1)	607 (2.8)	48 (1.0)	586 (2.3)	23 (1.1)	558 (2.9)	9.3 (0.05)
Azerbaijan r	28 (1.2)	495 (6.7)	68 (1.1)	468 (6.1)	5 (0.4)	435 (9.1)	9.8 (0.04)
Korea, Rep. of	23 (0.7)	627 (2.7)	48 (0.9)	606 (2.3)	29 (1.0)	586 (2.7)	9.0 (0.03)
International Avg.	48 (0.2)	509 (0.5)	36 (0.1)	478 (0.6)	16 (0.1)	466 (0.9)	

Centerpoint of scale set at 10.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

TIMSS & PIRLS International Study Center
Lynch School of Education, Boston College

Exhibit 8.1: Students Like Learning Mathematics (Continued)

Country	Like Learning Mathematics		Somewhat Like Learning Mathematics		Do Not Like Learning Mathematics		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Sixth Grade Participants							
Botswana	46 (1.3)	457 (3.2)	42 (1.0)	392 (4.3)	12 (0.7)	381 (8.1)	10.0 (0.05)
Yemen	41 (1.7)	382 (6.1)	47 (1.5)	328 (6.0)	12 (0.9)	328 (7.3)	9.9 (0.06)
Honduras	34 (1.6)	424 (5.6)	54 (1.6)	379 (6.0)	12 (1.0)	405 (9.7)	9.7 (0.06)
Benchmarking Participants							
Dubai, UAE	58 (1.0)	489 (2.1)	31 (0.8)	445 (3.1)	11 (0.6)	445 (4.9)	10.4 (0.05)
Abu Dhabi, UAE	54 (1.7)	444 (4.2)	35 (1.3)	386 (5.5)	12 (0.9)	393 (10.1)	10.4 (0.07)
North Carolina, US	49 (1.4)	563 (4.0)	34 (1.3)	551 (5.2)	17 (1.0)	542 (6.1)	10.0 (0.07)
Florida, US	45 (1.2)	557 (3.7)	34 (1.1)	541 (3.7)	21 (1.0)	531 (4.4)	9.8 (0.06)
Quebec, Canada	42 (1.2)	547 (2.5)	37 (0.9)	532 (3.1)	22 (1.2)	510 (3.9)	9.7 (0.05)
Alberta, Canada	36 (1.2)	520 (3.2)	40 (0.9)	505 (3.1)	25 (1.1)	491 (3.0)	9.4 (0.06)
Ontario, Canada	35 (1.1)	533 (4.2)	39 (0.9)	517 (3.3)	26 (1.1)	500 (3.1)	9.3 (0.06)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

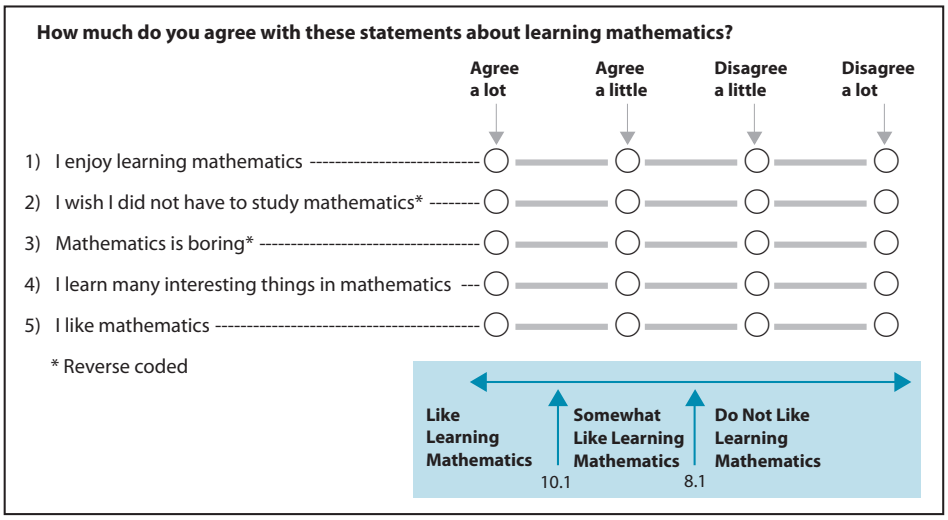


Exhibit 8.2: Students Like Learning Mathematics

Reported by Students

Students were scored according to their degree of agreement with five statements on the *Students Like Learning Mathematics* scale. Students who **Like Learning Mathematics** had a score on the scale of at least 11.3, which corresponds to their "agreeing a lot" with three of the five statements and "agreeing a little" with the other two, on average. Students who **Do Not Like Learning Mathematics** had a score no higher than 9.0, which corresponds to their "disagreeing a little" with three of the five statements and "agreeing a little" with the other two, on average. All other students **Somewhat Like Learning Mathematics.**

Country	Like Learning Mathematics		Somewhat Like Learning Mathematics		Do Not Like Learning Mathematics		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Morocco	48 (0.7)	398 (2.4)	40 (0.7)	353 (2.2)	12 (0.5)	340 (4.6)	11.2 (0.03)
Armenia	43 (1.0)	499 (3.1)	39 (0.8)	451 (3.4)	18 (1.0)	437 (4.8)	10.9 (0.05)
Jordan	42 (1.5)	442 (3.7)	39 (1.0)	388 (4.2)	19 (0.9)	376 (4.8)	10.9 (0.06)
Georgia	42 (1.3)	463 (5.0)	40 (1.0)	423 (4.1)	18 (1.0)	405 (6.2)	10.8 (0.06)
Malaysia	39 (1.3)	463 (5.0)	46 (0.9)	430 (5.6)	15 (0.9)	413 (8.1)	10.8 (0.05)
Iran, Islamic Rep. of	39 (1.1)	450 (5.4)	40 (0.8)	396 (4.2)	22 (0.9)	388 (4.5)	10.6 (0.05)
Ghana	38 (1.4)	370 (4.8)	51 (1.2)	314 (4.0)	10 (0.5)	299 (6.7)	10.9 (0.05)
Oman	38 (0.8)	420 (3.0)	45 (0.8)	342 (3.6)	17 (0.7)	324 (4.4)	10.8 (0.04)
Kazakhstan	38 (1.5)	506 (4.4)	52 (1.3)	478 (4.4)	10 (0.7)	475 (7.4)	10.9 (0.05)
Tunisia	38 (1.0)	448 (3.4)	40 (0.8)	415 (3.2)	23 (0.9)	405 (3.3)	10.6 (0.05)
Syrian Arab Republic	37 (1.1)	408 (5.2)	44 (1.0)	373 (4.8)	19 (0.9)	353 (6.3)	10.7 (0.05)
Ukraine	36 (1.7)	502 (4.9)	43 (1.2)	477 (4.1)	20 (1.2)	450 (4.9)	10.6 (0.07)
Lebanon	35 (1.2)	475 (4.6)	43 (1.0)	441 (4.2)	21 (1.1)	425 (5.6)	10.6 (0.06)
Singapore	32 (0.7)	637 (3.9)	44 (0.7)	610 (4.1)	23 (0.7)	578 (4.4)	10.4 (0.03)
Turkey	31 (1.0)	504 (6.0)	42 (0.7)	436 (3.9)	26 (1.0)	420 (3.5)	10.3 (0.05)
United Arab Emirates	31 (0.7)	488 (2.3)	42 (0.6)	448 (2.5)	27 (0.8)	432 (2.5)	10.2 (0.04)
Palestinian Nat'l Auth.	31 (1.1)	447 (5.0)	43 (1.0)	394 (4.1)	26 (1.1)	375 (5.1)	10.3 (0.05)
Russian Federation	29 (1.1)	567 (4.7)	49 (0.9)	537 (3.6)	22 (1.0)	509 (4.1)	10.3 (0.04)
Saudi Arabia	29 (1.3)	436 (5.6)	40 (1.0)	389 (5.4)	32 (1.4)	364 (4.1)	10.1 (0.07)
Qatar	27 (1.0)	456 (4.5)	43 (0.8)	401 (3.7)	31 (1.2)	386 (4.8)	10.0 (0.05)
Thailand	26 (1.1)	456 (5.6)	57 (0.9)	420 (4.5)	16 (1.0)	408 (5.1)	10.3 (0.05)
Israel	26 (0.8)	536 (5.1)	40 (0.7)	523 (4.3)	35 (1.0)	496 (5.1)	9.9 (0.04)
Macedonia, Rep. of	24 (1.0)	462 (6.2)	40 (1.0)	422 (6.3)	36 (1.4)	425 (6.0)	9.8 (0.06)
Bahrain	24 (0.6)	454 (4.6)	38 (0.9)	413 (2.7)	38 (0.8)	381 (3.4)	9.8 (0.03)
Lithuania	22 (1.0)	531 (3.7)	44 (1.0)	506 (2.7)	34 (1.1)	482 (3.3)	9.8 (0.05)
Chile	22 (0.9)	449 (3.5)	40 (0.9)	416 (2.9)	38 (1.0)	398 (2.9)	9.8 (0.04)
Indonesia	20 (1.4)	396 (6.1)	70 (1.2)	385 (4.5)	10 (0.8)	382 (6.3)	10.4 (0.04)
United States	19 (0.6)	536 (3.2)	40 (0.6)	515 (3.0)	40 (0.8)	494 (2.8)	9.5 (0.04)
Hong Kong SAR	19 (0.8)	635 (4.4)	44 (1.0)	595 (3.8)	37 (1.3)	551 (4.6)	9.6 (0.05)
Romania	18 (1.0)	516 (6.1)	40 (1.0)	459 (4.3)	41 (1.2)	438 (4.8)	9.5 (0.05)
Italy	18 (0.9)	538 (3.6)	42 (0.9)	507 (2.8)	40 (1.3)	472 (3.2)	9.6 (0.05)
New Zealand	17 (1.0)	525 (6.9)	41 (1.0)	497 (5.7)	42 (1.5)	467 (4.8)	9.5 (0.06)
Norway	17 (0.9)	511 (4.1)	42 (1.0)	482 (2.6)	42 (1.4)	453 (2.8)	9.4 (0.05)
Australia	16 (0.9)	553 (7.5)	40 (0.9)	520 (5.6)	45 (1.4)	476 (4.4)	9.3 (0.06)
Hungary	15 (0.7)	549 (5.6)	35 (1.0)	508 (4.8)	50 (1.3)	491 (3.8)	9.2 (0.05)
England	14 (1.0)	548 (8.9)	44 (1.3)	517 (5.7)	42 (1.7)	484 (5.2)	9.4 (0.07)
Chinese Taipei	14 (0.7)	681 (4.3)	33 (0.9)	645 (3.6)	53 (1.2)	568 (3.2)	9.0 (0.06)
Sweden	13 (0.6)	524 (4.0)	42 (0.7)	498 (1.8)	44 (1.0)	462 (2.1)	9.4 (0.04)
Finland	10 (0.6)	560 (4.1)	34 (1.0)	532 (2.8)	57 (1.1)	496 (2.6)	8.8 (0.05)
Japan	9 (0.6)	621 (5.1)	38 (1.1)	589 (3.3)	53 (1.4)	545 (3.1)	9.1 (0.05)
Korea, Rep. of	8 (0.3)	677 (4.7)	36 (0.7)	649 (3.3)	56 (0.8)	581 (2.9)	8.9 (0.03)
Slovenia	6 (0.4)	544 (5.3)	31 (1.1)	521 (3.0)	63 (1.3)	494 (2.4)	8.6 (0.05)
International Avg.	26 (0.2)	504 (0.8)	42 (0.1)	467 (0.6)	31 (0.2)	443 (0.7)	

Centerpoint of scale set at 10.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 8.2: Students Like Learning Mathematics (Continued)

Country	Like Learning Mathematics		Somewhat Like Learning Mathematics		Do Not Like Learning Mathematics		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Ninth Grade Participants							
Botswana	47 (1.1)	427 (2.5)	38 (0.8)	376 (2.6)	16 (0.8)	370 (4.3)	11.0 (0.05)
South Africa	41 (0.9)	378 (2.0)	44 (0.7)	339 (2.9)	15 (0.6)	348 (5.3)	10.8 (0.04)
Honduras	23 (1.0)	364 (4.6)	49 (0.9)	332 (4.2)	28 (1.1)	334 (4.8)	10.1 (0.06)
Benchmarking Participants							
Abu Dhabi, UAE	32 (1.2)	485 (4.4)	42 (1.0)	441 (3.6)	26 (1.4)	420 (4.9)	10.3 (0.06)
Dubai, UAE	29 (1.0)	508 (3.5)	41 (0.9)	473 (3.1)	30 (1.0)	456 (3.1)	10.1 (0.05)
Ontario, Canada	26 (1.1)	546 (3.5)	41 (1.0)	513 (3.4)	34 (1.4)	481 (3.0)	9.9 (0.06)
North Carolina, US	24 (1.8)	556 (7.6)	44 (1.1)	542 (7.8)	31 (2.3)	516 (7.0)	9.9 (0.11)
Connecticut, US	22 (1.5)	552 (6.0)	40 (1.2)	526 (5.2)	38 (1.8)	495 (5.4)	9.7 (0.08)
Colorado, US	20 (1.6)	548 (5.9)	38 (1.7)	528 (4.8)	42 (2.1)	495 (5.8)	9.4 (0.10)
Massachusetts, US	19 (1.3)	585 (6.1)	40 (1.0)	568 (5.4)	41 (1.7)	543 (5.4)	9.4 (0.09)
Minnesota, US	18 (1.5)	578 (6.8)	41 (0.9)	555 (4.7)	41 (1.6)	521 (4.6)	9.5 (0.08)
Alabama, US	18 (1.9)	475 (10.7)	37 (0.9)	471 (6.7)	45 (1.7)	460 (5.3)	9.3 (0.11)
Florida, US	17 (1.1)	552 (9.7)	38 (1.4)	525 (6.9)	45 (1.7)	493 (6.2)	9.4 (0.08)
California, US	17 (0.9)	519 (6.4)	42 (1.3)	496 (6.1)	41 (1.8)	480 (5.0)	9.4 (0.07)
Alberta, Canada	16 (0.9)	531 (4.7)	44 (1.0)	514 (2.5)	40 (1.4)	486 (3.1)	9.4 (0.06)
Indiana, US	16 (1.4)	547 (6.2)	39 (1.3)	529 (5.3)	45 (2.0)	507 (5.0)	9.3 (0.10)
Quebec, Canada	12 (0.7)	557 (3.9)	43 (0.9)	540 (2.4)	44 (1.2)	517 (2.6)	9.3 (0.05)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

How much do you agree with these statements about learning mathematics?

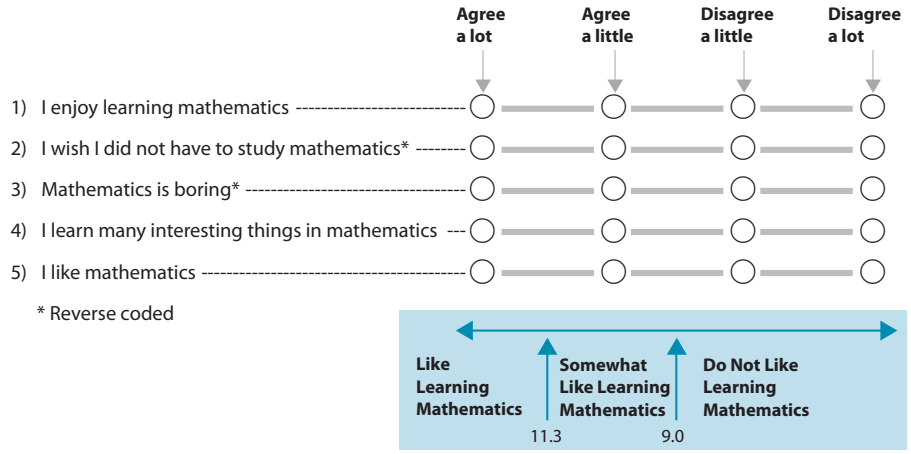


Exhibit 8.3: Students Value Mathematics

TIMSS 2011 Mathematics 8th Grade

Reported by Students

Students were scored according to their degree of agreement with six statements on the *Students Value Mathematics* scale. Students who **Value** mathematics had a score on the scale of at least 10.3, which corresponds to their "agreeing a lot" with three of the six statements and "agreeing a little" with the other three, on average. Students who **Do Not Value** mathematics had a score no higher than 7.9, which corresponds to their "disagreeing a little" with three of the six statements and "agreeing a little" with the other three, on average. All other students **Somewhat Value** mathematics.

Country	Value		Somewhat Value		Do Not Value		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Ghana	78 (0.8)	343 (4.4)	18 (0.7)	304 (5.3)	4 (0.5)	281 (6.7)	11.5 (0.04)
Morocco	78 (0.6)	380 (2.2)	18 (0.5)	351 (2.8)	4 (0.3)	334 (6.8)	11.5 (0.03)
Jordan	69 (0.8)	422 (3.4)	24 (0.7)	393 (4.1)	7 (0.5)	340 (8.4)	11.1 (0.04)
Oman	67 (0.7)	386 (2.5)	26 (0.6)	342 (4.2)	7 (0.4)	298 (6.5)	10.9 (0.04)
Palestinian Nat'l Auth.	67 (1.0)	421 (3.8)	26 (0.8)	381 (4.1)	8 (0.6)	346 (6.4)	10.9 (0.05)
Syrian Arab Republic	65 (1.0)	392 (4.5)	27 (0.9)	367 (5.4)	8 (0.6)	346 (7.1)	10.9 (0.05)
Tunisia	64 (0.9)	434 (3.0)	28 (0.7)	414 (3.5)	8 (0.5)	397 (4.1)	10.8 (0.04)
Georgia	62 (1.1)	442 (4.3)	31 (0.9)	429 (4.4)	7 (0.5)	403 (8.1)	10.6 (0.04)
Israel	61 (1.0)	525 (4.2)	31 (0.9)	512 (4.7)	8 (0.5)	471 (9.0)	10.6 (0.04)
Iran, Islamic Rep. of	55 (1.1)	423 (4.9)	34 (0.8)	410 (4.7)	11 (0.6)	393 (5.6)	10.3 (0.04)
Chile	54 (0.9)	424 (3.1)	37 (0.8)	410 (2.8)	9 (0.5)	399 (4.3)	10.3 (0.03)
Ukraine	54 (1.4)	488 (4.1)	34 (1.1)	473 (4.8)	12 (1.0)	466 (6.1)	10.1 (0.06)
United Arab Emirates	54 (0.7)	466 (2.3)	36 (0.6)	451 (2.2)	11 (0.4)	427 (3.8)	10.3 (0.03)
Lebanon	53 (1.4)	461 (4.2)	36 (1.2)	442 (4.5)	11 (0.7)	419 (6.3)	10.4 (0.06)
Kazakhstan	53 (1.2)	490 (4.3)	40 (1.2)	485 (4.3)	7 (0.5)	489 (8.3)	10.4 (0.05)
United States	51 (0.7)	521 (2.9)	38 (0.6)	503 (2.7)	11 (0.5)	488 (3.5)	10.2 (0.03)
Thailand	51 (1.2)	442 (4.5)	42 (1.1)	416 (4.6)	7 (0.5)	392 (6.6)	10.2 (0.04)
Saudi Arabia	51 (1.4)	408 (5.6)	35 (1.0)	387 (4.2)	13 (0.9)	363 (6.0)	10.2 (0.06)
Macedonia, Rep. of	49 (1.4)	428 (5.5)	36 (1.2)	436 (5.8)	15 (0.9)	434 (7.8)	10.2 (0.07)
Qatar	49 (1.0)	432 (3.9)	35 (0.8)	401 (3.6)	16 (0.9)	370 (5.7)	10.1 (0.06)
Malaysia	49 (1.5)	453 (5.1)	40 (0.9)	433 (5.7)	11 (0.8)	411 (8.6)	10.1 (0.06)
Bahrain	48 (0.8)	425 (2.7)	36 (0.7)	411 (2.9)	16 (0.6)	372 (5.6)	10.0 (0.04)
England	48 (1.2)	513 (6.1)	43 (1.1)	506 (5.8)	10 (0.6)	479 (6.6)	10.1 (0.05)
Armenia	47 (1.0)	478 (3.2)	34 (0.8)	460 (3.9)	19 (0.7)	460 (3.9)	10.1 (0.04)
Lithuania	46 (1.0)	513 (3.0)	41 (0.9)	499 (2.9)	12 (0.6)	479 (4.1)	10.0 (0.03)
Turkey	46 (1.0)	476 (5.3)	39 (0.8)	442 (3.7)	15 (0.6)	410 (4.3)	10.0 (0.04)
Australia	46 (0.9)	521 (5.6)	40 (0.8)	499 (4.8)	14 (0.7)	475 (6.1)	10.0 (0.04)
New Zealand	46 (1.1)	498 (5.7)	41 (0.9)	489 (5.7)	13 (0.7)	464 (5.6)	10.0 (0.04)
Russian Federation	43 (1.4)	547 (4.5)	41 (0.9)	534 (3.6)	15 (0.8)	532 (4.6)	9.8 (0.05)
Norway	43 (1.3)	484 (3.1)	44 (1.3)	473 (3.1)	13 (0.8)	451 (4.6)	9.9 (0.05)
Singapore	43 (0.7)	619 (4.0)	47 (0.7)	608 (3.9)	10 (0.5)	591 (5.6)	10.0 (0.03)
Hungary	34 (0.9)	519 (5.2)	46 (0.8)	502 (3.4)	20 (0.8)	489 (4.5)	9.5 (0.04)
Indonesia	31 (1.3)	392 (5.6)	61 (1.1)	386 (4.1)	8 (0.5)	367 (7.0)	9.7 (0.05)
Sweden	30 (0.8)	501 (2.6)	54 (0.8)	483 (2.0)	16 (0.7)	465 (2.8)	9.4 (0.03)
Romania	30 (1.1)	472 (5.7)	41 (1.1)	462 (4.8)	29 (1.2)	445 (4.6)	9.2 (0.05)
Hong Kong SAR	26 (0.8)	617 (4.5)	49 (1.0)	589 (3.9)	25 (1.0)	548 (5.3)	9.2 (0.04)
Slovenia	23 (0.8)	520 (3.1)	57 (0.9)	506 (2.4)	20 (1.0)	486 (3.3)	9.1 (0.03)
Italy	20 (0.7)	521 (3.4)	51 (0.8)	499 (2.7)	28 (0.9)	481 (3.0)	8.9 (0.03)
Finland	15 (0.8)	540 (4.0)	45 (1.0)	523 (2.6)	40 (1.3)	495 (2.9)	8.5 (0.05)
Korea, Rep. of	14 (0.6)	663 (5.5)	52 (0.8)	625 (3.1)	34 (0.8)	572 (3.0)	8.6 (0.03)
Chinese Taipei	13 (0.6)	658 (5.1)	41 (0.7)	633 (3.8)	46 (1.0)	574 (3.4)	8.3 (0.04)
Japan	13 (0.7)	599 (5.9)	50 (0.9)	578 (3.0)	38 (1.1)	546 (2.9)	8.5 (0.03)
International Avg.	46 (0.2)	482 (0.7)	39 (0.1)	463 (0.6)	15 (0.1)	439 (0.9)	

Centerpoint of scale set at 10.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 8.3: Students Value Mathematics (Continued)

Country	Value		Somewhat Value		Do Not Value		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Ninth Grade Participants							
South Africa	72 (0.8)	364 (2.3)	21 (0.5)	341 (3.9)	7 (0.4)	309 (5.3)	11.2 (0.04)
Botswana	72 (0.8)	414 (2.3)	22 (0.7)	367 (3.8)	6 (0.4)	324 (5.3)	11.2 (0.04)
Honduras	71 (1.0)	338 (3.8)	24 (0.8)	343 (4.7)	5 (0.4)	332 (7.4)	11.0 (0.05)
Benchmarking Participants							
North Carolina, US	56 (1.6)	546 (6.5)	38 (1.4)	528 (8.2)	6 (0.6)	513 (9.5)	10.4 (0.06)
Abu Dhabi, UAE	55 (1.2)	462 (4.3)	35 (1.0)	440 (3.7)	10 (0.7)	412 (6.1)	10.4 (0.05)
Ontario, Canada	55 (1.2)	526 (2.9)	37 (1.0)	497 (3.1)	8 (0.5)	471 (5.2)	10.4 (0.04)
Minnesota, US	55 (1.2)	560 (5.0)	36 (1.1)	532 (5.2)	9 (0.6)	514 (4.5)	10.3 (0.04)
Alabama, US	52 (1.1)	472 (7.4)	38 (1.1)	466 (5.4)	10 (1.1)	445 (7.3)	10.2 (0.06)
Colorado, US	52 (1.8)	528 (5.3)	37 (1.2)	513 (5.5)	11 (1.1)	490 (8.1)	10.2 (0.08)
Dubai, UAE	51 (0.9)	484 (2.8)	37 (0.9)	478 (2.6)	12 (0.5)	453 (4.4)	10.2 (0.04)
Connecticut, US	51 (1.7)	533 (5.3)	39 (1.4)	515 (5.0)	10 (0.8)	484 (7.2)	10.2 (0.07)
Indiana, US	51 (1.6)	533 (5.1)	38 (1.2)	515 (5.6)	11 (1.1)	497 (6.5)	10.1 (0.07)
California, US	49 (1.3)	499 (5.4)	40 (1.2)	491 (4.6)	11 (0.8)	480 (7.8)	10.1 (0.05)
Massachusetts, US	48 (1.3)	572 (6.0)	40 (1.3)	554 (4.9)	12 (1.0)	540 (6.4)	10.0 (0.04)
Alberta, Canada	47 (1.1)	515 (3.2)	41 (0.9)	503 (2.5)	13 (0.7)	480 (4.4)	10.0 (0.04)
Florida, US	47 (1.5)	528 (6.7)	40 (1.2)	506 (6.9)	13 (1.2)	497 (9.7)	10.0 (0.06)
Quebec, Canada	44 (1.0)	540 (2.7)	46 (0.9)	529 (2.6)	10 (0.6)	508 (3.8)	10.0 (0.04)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

How much do you agree with these statements about mathematics?

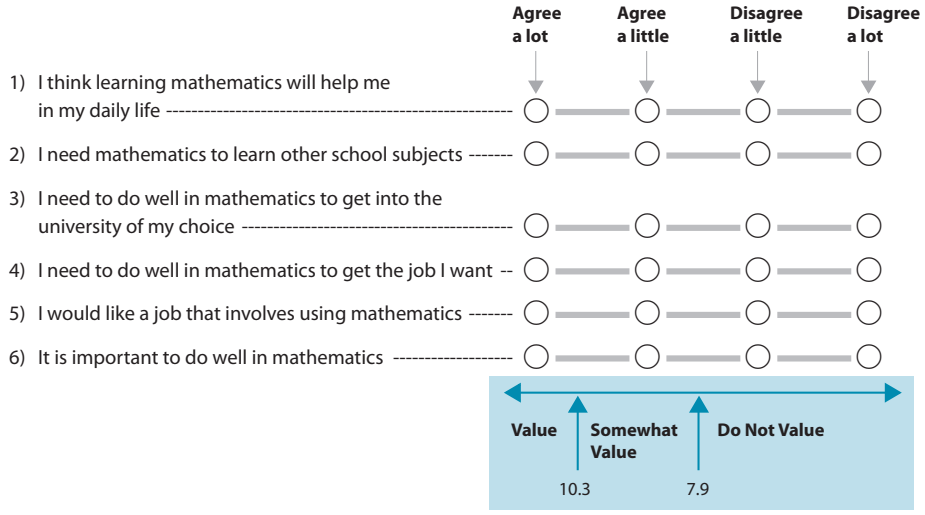


Exhibit 8.4: Students Confident in Mathematics

TIMSS 2011 Mathematics 4th Grade

Reported by Students

Students were scored according to their degree of agreement with seven statements on the *Students Confident in Mathematics* scale. Students **Confident** in mathematics had a score on the scale of at least 10.6, which corresponds to their "agreeing a lot" with four of the seven statements and "agreeing a little" with the other three, on average. Students who were **Not Confident** had a score no higher than 8.5, which corresponds to their "disagreeing a little" with four of the seven statements and "agreeing a little" with the other three, on average. All other students were **Somewhat Confident** with mathematics.

Country	Confident		Somewhat Confident		Not Confident		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Poland	49 (0.8)	509 (2.4)	38 (0.8)	469 (2.6)	13 (0.6)	421 (4.0)	10.6 (0.03)
Norway	45 (1.2)	515 (3.0)	43 (1.6)	485 (3.7)	12 (1.1)	459 (4.1)	10.5 (0.05)
Georgia	44 (1.2)	486 (3.3)	43 (1.0)	434 (4.4)	13 (0.7)	423 (6.6)	10.5 (0.05)
Malta	44 (0.8)	531 (1.9)	37 (0.8)	479 (1.9)	20 (0.7)	455 (3.2)	10.4 (0.03)
Austria	43 (0.9)	533 (3.2)	39 (1.0)	501 (3.1)	18 (0.8)	468 (3.2)	10.4 (0.04)
Ireland	43 (1.2)	552 (3.7)	41 (1.0)	520 (3.5)	16 (0.8)	489 (4.4)	10.3 (0.05)
Slovenia	43 (1.1)	543 (2.4)	44 (1.1)	501 (2.5)	13 (0.5)	459 (4.8)	10.5 (0.04)
Hungary	42 (0.9)	564 (3.0)	37 (0.7)	499 (4.0)	21 (0.7)	452 (5.2)	10.3 (0.04)
Oman	42 (1.1)	429 (3.2)	45 (0.9)	365 (2.8)	13 (0.5)	322 (6.1)	10.5 (0.04)
United Arab Emirates	42 (0.8)	466 (2.2)	45 (0.6)	416 (2.6)	13 (0.4)	405 (4.3)	10.4 (0.03)
Kazakhstan	42 (1.4)	518 (4.7)	46 (1.3)	493 (5.3)	13 (0.9)	486 (5.5)	10.5 (0.06)
Iran, Islamic Rep. of	41 (1.3)	461 (4.0)	45 (1.2)	417 (3.7)	14 (0.6)	389 (5.5)	10.5 (0.06)
United States	40 (0.6)	575 (1.8)	41 (0.6)	530 (2.4)	19 (0.6)	500 (1.9)	10.2 (0.03)
Croatia	40 (0.9)	523 (2.4)	37 (0.8)	482 (2.4)	23 (0.8)	448 (2.8)	10.2 (0.04)
Sweden	40 (1.1)	527 (2.4)	47 (0.9)	496 (2.1)	13 (0.6)	472 (4.3)	10.3 (0.04)
Saudi Arabia	40 (1.6)	441 (6.2)	50 (1.4)	396 (5.6)	10 (0.8)	369 (10.3)	10.4 (0.06)
Germany	40 (0.8)	557 (2.7)	40 (0.8)	525 (2.3)	20 (0.7)	488 (3.1)	10.2 (0.04)
Turkey	39 (1.0)	520 (4.1)	44 (0.7)	451 (4.1)	16 (0.7)	411 (6.1)	10.3 (0.04)
Romania	39 (1.2)	535 (4.2)	41 (1.1)	461 (7.7)	19 (1.1)	430 (9.8)	10.2 (0.05)
Australia	38 (0.9)	550 (3.5)	41 (0.9)	507 (3.1)	21 (0.7)	478 (4.3)	10.1 (0.04)
Armenia	37 (1.1)	481 (3.8)	42 (1.0)	447 (4.2)	20 (0.7)	417 (5.4)	10.2 (0.04)
Kuwait	37 (1.1)	380 (3.8)	51 (1.2)	330 (4.0)	12 (0.8)	313 (5.9)	10.3 (0.05)
Bahrain	37 (1.0)	472 (3.7)	50 (0.8)	428 (3.2)	13 (0.7)	395 (6.5)	10.2 (0.04)
Netherlands	37 (0.9)	568 (2.1)	41 (0.9)	536 (2.0)	22 (0.7)	502 (2.5)	10.1 (0.04)
Qatar	36 (1.3)	462 (4.4)	49 (1.1)	398 (3.6)	15 (0.7)	375 (6.8)	10.2 (0.05)
Serbia	36 (1.0)	560 (3.4)	46 (1.0)	508 (3.3)	18 (1.1)	452 (5.9)	10.1 (0.05)
Slovak Republic	35 (1.0)	546 (3.5)	43 (0.8)	499 (3.8)	22 (0.8)	461 (4.1)	10.0 (0.05)
Northern Ireland	35 (1.3)	598 (4.0)	44 (1.2)	557 (3.0)	21 (0.8)	519 (5.0)	10.0 (0.05)
Spain	35 (1.1)	518 (2.7)	42 (0.9)	475 (3.2)	23 (1.0)	446 (3.7)	10.0 (0.06)
Finland	35 (0.8)	579 (3.0)	42 (0.7)	543 (2.6)	23 (0.7)	503 (3.2)	9.9 (0.03)
Azerbaijan r	34 (1.4)	509 (6.1)	50 (1.3)	459 (6.0)	16 (0.8)	444 (6.9)	10.1 (0.06)
England	33 (1.0)	572 (4.6)	48 (0.9)	538 (3.8)	19 (0.7)	503 (4.4)	10.0 (0.04)
Tunisia	33 (1.5)	392 (5.4)	54 (1.2)	352 (4.0)	13 (0.8)	322 (6.1)	10.1 (0.06)
Russian Federation	33 (1.0)	571 (4.3)	41 (0.7)	544 (4.2)	26 (0.8)	504 (4.0)	9.8 (0.04)
Czech Republic	31 (1.1)	540 (3.6)	46 (1.0)	510 (2.8)	23 (1.0)	474 (3.3)	9.8 (0.04)
Italy	30 (0.9)	534 (3.3)	53 (0.8)	506 (2.9)	17 (0.7)	471 (4.0)	9.9 (0.04)
Denmark	30 (1.0)	571 (2.9)	51 (0.9)	535 (2.7)	19 (0.8)	497 (4.0)	9.9 (0.04)
Lithuania	30 (0.9)	577 (3.1)	47 (0.9)	527 (2.8)	23 (0.7)	492 (3.3)	9.8 (0.04)
Belgium (Flemish)	28 (0.9)	584 (2.6)	50 (1.1)	546 (2.2)	22 (0.7)	511 (2.7)	9.8 (0.04)
New Zealand	25 (0.7)	520 (3.7)	50 (0.8)	484 (2.9)	25 (0.6)	459 (3.6)	9.6 (0.03)
Portugal	25 (1.3)	579 (3.6)	50 (1.3)	530 (3.4)	25 (1.3)	490 (4.9)	9.6 (0.05)
Hong Kong SAR	24 (0.9)	641 (3.1)	44 (0.9)	600 (5.1)	31 (1.0)	575 (2.9)	9.4 (0.05)
Chile	23 (0.7)	518 (2.7)	46 (0.8)	459 (2.4)	31 (0.9)	428 (3.2)	9.4 (0.04)
Morocco	22 (1.1)	380 (4.9)	58 (1.2)	330 (4.9)	19 (1.4)	308 (6.7)	9.7 (0.05)
Singapore	21 (0.8)	658 (2.8)	41 (0.7)	614 (3.3)	38 (1.0)	570 (3.1)	9.2 (0.04)
Chinese Taipei	20 (0.7)	634 (2.6)	42 (0.8)	597 (2.4)	38 (0.9)	564 (2.4)	9.2 (0.04)
Yemen	18 (1.4)	300 (7.9)	58 (1.4)	249 (5.8)	24 (1.4)	217 (8.0)	9.5 (0.06)
Thailand	13 (0.7)	493 (6.2)	64 (1.0)	458 (5.2)	23 (1.1)	442 (5.6)	9.3 (0.04)
Korea, Rep. of	11 (0.5)	660 (4.3)	50 (0.9)	622 (1.9)	38 (1.0)	567 (2.0)	9.0 (0.03)
Japan	9 (0.5)	640 (3.9)	43 (0.8)	605 (2.1)	48 (0.9)	558 (1.9)	8.6 (0.03)
International Avg.	34 (0.1)	527 (0.5)	46 (0.1)	484 (0.5)	21 (0.1)	452 (0.7)	

Centerpoint of scale set at 10.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 8.4: Students Confident in Mathematics (Continued)

Country	Confident		Somewhat Confident		Not Confident		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Sixth Grade Participants							
Yemen	20 (1.2)	397 (6.2)	59 (1.4)	344 (5.8)	21 (1.3)	322 (7.7)	9.6 (0.05)
Botswana	19 (0.9)	473 (5.1)	52 (1.0)	408 (3.4)	29 (1.0)	410 (5.3)	9.4 (0.04)
Honduras	18 (1.0)	442 (7.5)	61 (1.3)	388 (5.7)	21 (1.0)	389 (6.3)	9.5 (0.04)
Benchmarking Participants							
North Carolina, US	42 (1.5)	585 (3.9)	40 (1.2)	544 (4.7)	18 (1.3)	508 (4.7)	10.3 (0.07)
Abu Dhabi, UAE	41 (1.6)	452 (4.6)	46 (1.4)	398 (5.0)	13 (0.8)	385 (8.4)	10.4 (0.06)
Florida, US	41 (1.3)	578 (3.5)	38 (1.0)	533 (3.4)	21 (1.0)	507 (3.7)	10.3 (0.06)
Dubai, UAE	41 (1.0)	500 (2.4)	45 (0.8)	454 (2.4)	15 (0.7)	442 (3.7)	10.4 (0.04)
Quebec, Canada	37 (1.0)	562 (2.5)	44 (1.1)	527 (2.9)	19 (1.0)	490 (3.7)	10.1 (0.05)
Alberta, Canada	35 (1.1)	537 (2.8)	44 (1.0)	501 (2.7)	21 (0.9)	468 (3.8)	10.0 (0.05)
Ontario, Canada	33 (1.0)	558 (3.5)	46 (0.9)	510 (3.2)	21 (0.9)	475 (3.0)	10.0 (0.05)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

How much do you agree with these statements about mathematics?

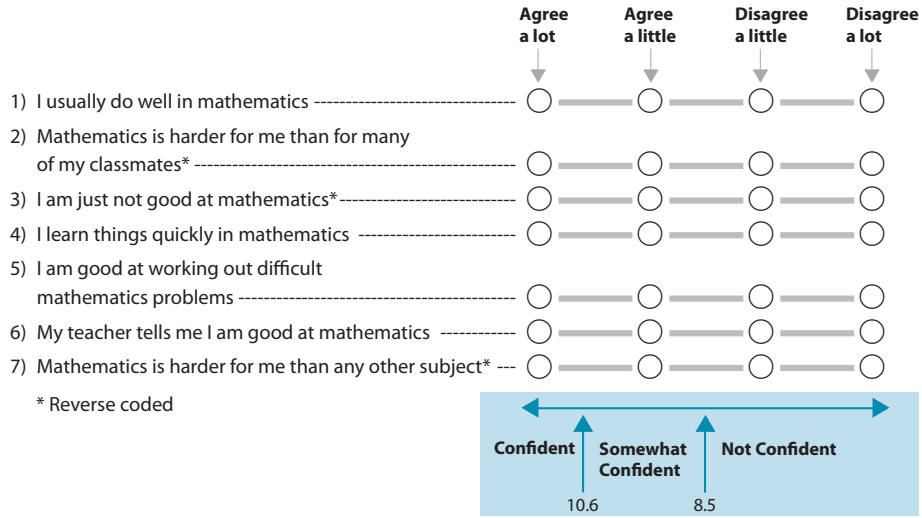


Exhibit 8.5: Students Confident in Mathematics

TIMSS 2011 Mathematics 8th Grade

Reported by Students

Students were scored according to their degree of agreement with nine statements on the *Students Confident in Mathematics* scale. Students **Confident** in mathematics had a score on the scale of at least 12.0, which corresponds to their "agreeing a lot" with five of the nine statements and "agreeing a little" with the other four, on average. Students who were **Not Confident** had a score no higher than 9.4, which corresponds to their "disagreeing a little" with five of the nine statements and "agreeing a little" with the other four, on average. All other students were **Somewhat Confident** with mathematics.

Country	Confident		Somewhat Confident		Not Confident		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Israel	31 (1.0)	573 (4.1)	47 (0.9)	504 (3.9)	22 (0.9)	463 (5.5)	11.1 (0.05)
United States	24 (0.8)	556 (3.1)	44 (0.7)	514 (2.7)	33 (0.8)	474 (3.0)	10.5 (0.04)
Jordan	22 (0.8)	482 (3.9)	54 (0.8)	399 (3.7)	24 (0.8)	365 (4.7)	10.7 (0.04)
Norway	22 (0.8)	533 (2.3)	44 (0.9)	481 (2.7)	34 (1.2)	430 (2.7)	10.4 (0.06)
Saudi Arabia	21 (1.2)	464 (5.7)	52 (0.8)	392 (4.8)	27 (1.1)	348 (3.5)	10.6 (0.07)
United Arab Emirates	20 (0.5)	516 (2.6)	53 (0.5)	451 (2.1)	27 (0.6)	422 (2.5)	10.6 (0.03)
Lebanon	19 (1.1)	500 (4.8)	53 (1.0)	447 (4.3)	28 (1.1)	420 (4.0)	10.5 (0.06)
Qatar	18 (0.8)	484 (5.4)	52 (0.8)	404 (3.3)	30 (0.9)	379 (3.8)	10.5 (0.04)
Iran, Islamic Rep. of	18 (0.8)	489 (6.9)	46 (0.8)	413 (4.1)	35 (1.1)	381 (3.8)	10.3 (0.05)
Australia	17 (1.1)	581 (6.8)	46 (0.8)	516 (4.8)	37 (1.4)	456 (3.8)	10.2 (0.07)
Palestinian Nat'l Auth.	17 (0.7)	478 (5.0)	54 (1.0)	404 (3.9)	29 (1.1)	364 (4.1)	10.5 (0.04)
Oman	17 (0.6)	457 (3.2)	59 (0.9)	362 (3.1)	24 (0.8)	322 (4.4)	10.6 (0.03)
Bahrain	16 (0.5)	490 (3.9)	45 (0.8)	417 (2.5)	39 (0.8)	372 (3.1)	10.2 (0.03)
New Zealand	16 (1.0)	561 (6.6)	45 (1.0)	501 (5.3)	39 (1.3)	448 (4.6)	10.1 (0.06)
Ghana	16 (0.8)	389 (5.4)	57 (0.8)	328 (4.1)	27 (1.0)	314 (5.2)	10.5 (0.05)
Hungary	16 (0.7)	593 (4.4)	35 (0.9)	521 (4.0)	49 (1.1)	466 (4.0)	9.8 (0.05)
England	16 (1.1)	571 (6.2)	53 (1.1)	514 (5.4)	32 (1.6)	465 (5.4)	10.3 (0.07)
Sweden	15 (0.5)	551 (2.9)	50 (0.8)	496 (2.1)	35 (0.9)	441 (2.1)	10.2 (0.03)
Georgia	15 (0.7)	534 (4.6)	44 (1.3)	444 (4.2)	41 (1.2)	391 (4.1)	10.1 (0.04)
Finland	15 (0.8)	580 (2.9)	39 (0.8)	533 (2.5)	46 (1.2)	477 (2.5)	9.8 (0.06)
Syrian Arab Republic	15 (0.7)	426 (5.9)	56 (1.0)	382 (4.7)	29 (1.1)	359 (5.2)	10.4 (0.04)
Macedonia, Rep. of	14 (0.8)	527 (6.5)	42 (1.1)	429 (6.4)	44 (1.2)	404 (4.8)	10.0 (0.05)
Tunisia	14 (0.6)	488 (4.7)	50 (0.9)	426 (3.1)	36 (1.0)	398 (2.9)	10.2 (0.04)
Turkey	14 (0.8)	586 (8.1)	37 (0.9)	459 (4.1)	49 (1.0)	411 (3.0)	9.8 (0.05)
Kazakhstan	14 (1.0)	531 (5.4)	53 (1.0)	491 (4.4)	33 (1.3)	467 (4.8)	10.3 (0.06)
Singapore	14 (0.5)	662 (4.1)	46 (0.8)	628 (3.6)	40 (0.9)	574 (4.3)	10.0 (0.04)
Armenia	13 (0.6)	542 (4.1)	44 (1.1)	477 (3.1)	42 (1.0)	438 (3.6)	9.9 (0.03)
Morocco	13 (0.5)	434 (3.9)	54 (0.7)	374 (2.4)	33 (0.8)	347 (3.1)	10.2 (0.03)
Lithuania	13 (0.5)	579 (2.9)	41 (1.2)	519 (3.3)	46 (1.3)	467 (2.6)	9.8 (0.05)
Italy	12 (0.6)	559 (3.9)	44 (0.9)	519 (2.6)	43 (0.9)	460 (2.7)	9.9 (0.04)
Russian Federation	12 (0.7)	603 (4.7)	43 (1.0)	561 (3.5)	45 (1.0)	501 (3.9)	9.9 (0.04)
Chile	11 (0.5)	499 (4.5)	36 (1.0)	433 (3.0)	53 (1.1)	389 (2.5)	9.6 (0.04)
Slovenia	11 (0.6)	586 (3.8)	49 (1.0)	521 (2.1)	40 (1.1)	464 (2.4)	10.0 (0.04)
Romania	9 (0.6)	573 (6.9)	32 (1.0)	485 (5.3)	59 (1.2)	428 (4.4)	9.3 (0.05)
Hong Kong SAR	7 (0.4)	655 (5.5)	37 (1.0)	610 (4.4)	55 (1.1)	561 (4.0)	9.3 (0.04)
Chinese Taipei	7 (0.4)	709 (5.0)	26 (0.7)	670 (3.4)	67 (0.9)	575 (2.9)	8.6 (0.05)
Ukraine	5 (0.5)	574 (8.5)	48 (1.4)	507 (4.1)	48 (1.4)	445 (3.9)	9.6 (0.04)
Korea, Rep. of	3 (0.2)	723 (6.7)	34 (0.8)	669 (2.9)	63 (0.8)	577 (2.8)	9.1 (0.03)
Malaysia	3 (0.3)	532 (10.4)	39 (1.0)	453 (6.3)	58 (1.1)	427 (4.8)	9.3 (0.04)
Indonesia	3 (0.5)	394 (12.1)	52 (1.7)	383 (5.7)	45 (1.8)	390 (3.9)	9.7 (0.05)
Japan	2 (0.3)	~ ~	24 (0.8)	623 (3.2)	73 (0.9)	548 (2.8)	8.6 (0.04)
Thailand	2 (0.3)	~ ~	44 (1.1)	434 (4.8)	54 (1.2)	420 (4.0)	9.3 (0.03)
International Avg.	14 (0.1)	539 (0.9)	45 (0.1)	478 (0.6)	41 (0.2)	435 (0.6)	

Centerpoint of scale set at 10.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

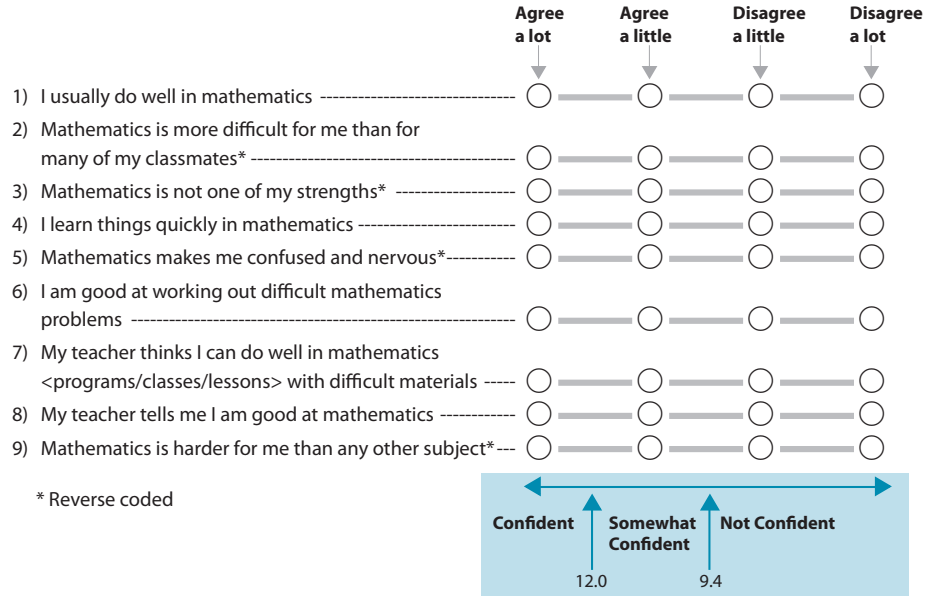
SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 8.5: Students Confident in Mathematics (Continued)

Country	Confident		Somewhat Confident		Not Confident		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Ninth Grade Participants							
South Africa	10 (0.4)	427 (4.9)	54 (0.8)	349 (2.7)	35 (0.9)	344 (3.0)	10.0 (0.03)
Botswana	9 (0.5)	481 (4.5)	48 (0.9)	397 (2.6)	44 (1.1)	385 (2.6)	9.7 (0.04)
Honduras	8 (0.5)	403 (6.9)	41 (1.0)	345 (4.0)	51 (1.2)	326 (4.0)	9.6 (0.04)
Benchmarking Participants							
Ontario, Canada	32 (0.9)	564 (2.5)	40 (0.8)	508 (2.9)	28 (0.9)	454 (2.9)	11.0 (0.05)
North Carolina, US	30 (2.3)	578 (7.6)	44 (1.4)	532 (6.7)	26 (2.0)	501 (5.9)	10.9 (0.13)
Connecticut, US	29 (1.2)	568 (4.4)	43 (1.3)	518 (4.9)	28 (1.4)	475 (5.9)	10.9 (0.07)
Massachusetts, US	27 (1.6)	604 (6.2)	43 (1.5)	562 (5.3)	30 (1.7)	520 (4.3)	10.7 (0.10)
Minnesota, US	25 (1.7)	593 (5.3)	44 (1.1)	552 (4.4)	31 (1.5)	497 (4.1)	10.6 (0.09)
Alberta, Canada	24 (0.8)	555 (2.6)	43 (0.9)	511 (2.7)	33 (1.0)	461 (2.7)	10.5 (0.06)
Florida, US	23 (1.5)	569 (7.7)	43 (1.4)	518 (6.7)	34 (2.2)	476 (5.2)	10.5 (0.10)
Colorado, US	22 (1.3)	573 (4.6)	44 (1.2)	524 (4.7)	33 (1.7)	473 (4.5)	10.5 (0.09)
Indiana, US	22 (1.4)	563 (5.4)	44 (1.2)	532 (4.6)	34 (1.8)	483 (5.0)	10.4 (0.10)
Dubai, UAE	21 (0.9)	538 (4.2)	49 (0.9)	476 (2.7)	30 (1.1)	441 (2.5)	10.5 (0.05)
Quebec, Canada	21 (0.9)	574 (2.8)	47 (0.9)	540 (2.3)	32 (1.1)	492 (2.8)	10.5 (0.05)
Abu Dhabi, UAE	20 (0.9)	512 (4.9)	54 (0.8)	443 (3.3)	26 (1.1)	413 (4.4)	10.6 (0.05)
California, US	20 (1.1)	542 (5.2)	43 (1.3)	501 (5.2)	37 (1.7)	459 (4.7)	10.3 (0.08)
Alabama, US	20 (1.5)	514 (9.7)	41 (1.2)	469 (6.4)	39 (2.1)	441 (5.2)	10.2 (0.13)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

How much do you agree with these statements about mathematics?



Students Confident in Mathematics

Exhibit 8.4 presents the fourth grade results for the TIMSS 2011 Students Confident in Mathematics scale, which includes seven such statements as "Mathematics is harder for me than for many of my classmates" (reverse coded) and "My teacher tells me I am good at mathematics" (see second page of exhibit for all seven statements). **Confident** students "agreed a lot" with four of the seven statements and "agreed a little" to the other three, on average. Students **Not Confident** in mathematics "disagreed a little" with four of the statements and "agreed a little" with the other three, on average.

Internationally, on average, 34 percent of the fourth grade students expressed confidence in their mathematics ability. Average mathematics achievement was highest for the **Confident** fourth grade students and lowest (by 75 points) for the students lacking confidence (21% across countries). Looking across countries, the majority of fourth grade students were not very confident about their mathematics ability. Also, similar to the results for "liking" to learn mathematics, students in some of the highest performing countries expressed the least confidence. For the sixth grade participants, somewhat fewer students expressed confidence (18–20%), but similar percentages expressed a lack of confidence (21–29%).

Exhibit 8.5 presents the eighth grade results for the Students Confident in Mathematics scale, which contained nine statements. Compared to the fourth grade scale, two additional statements at the eighth grade addressed the issue of the increasing difficulty of the subject, such as "Mathematics makes me confused and nervous" (reverse coded, see the second page of the exhibit for details). **Confident** students had a score corresponding to "agreeing a lot" with five of the nine statements and "agreeing a little" with the other four, on average. Internationally, on average, only 14 percent of the eighth grade students expressed confidence in their mathematics ability. Primarily the students were divided equally between those expressing some confidence (45%) and those expressing little confidence (41%). At the eighth grade, on average, the confidence gap was particular large—104 points—between the small percentage of **Confident** students and those **Not Confident**. To at least some extent, the eighth grade results held constant across the ninth grade and benchmarking participants.

Instructional Time

Instructional Time Spent on Mathematics

It is difficult to examine the effect of instructional time on student achievement, because a wide variety of factors influence the productivity of instruction hours—most importantly, the quality of the curriculum and instructional approaches (and all of the variables influencing them). In addition, the relationship between instructional time and student achievement is highly dependent on the effectiveness of the educational system. If an education system essentially is ineffective, increasing the amount of instruction time will have diminishing returns. Also, most countries set levels of instructional time across their systems as a matter of policy, so that any variation is unintended and rarely related to achievement.

Despite the difficulties in studying its effects, instructional time remains a crucial resource in considering students' opportunity to learn. If everything else about schooling was equal and of high quality, more instructional time should result in increased student learning. For example, a recent study published by the London School of Economics used data from PISA 2006 and from 10- and 13-year-olds in Israel to compare achievement estimates for the same students across curriculum subjects, and found that instructional time has a positive and significant effect on achievement (Lavy, 2010).

Exhibits 8.6 and 8.7 present principals' and teachers' reports about the instructional hours per year spent on mathematics instruction, respectively, at the fourth and eighth grades. The results for the time spent on mathematics instruction were based on a series of calculations. As explained on the second page of the exhibits, principals provided the number of school days per year and the number of instructional hours per day. This information was combined to show the yearly total number of instructional hours in each country shown in the first column of the exhibit. There was substantial variation across countries, but the fourth grade students in the TIMSS 2011 countries averaged about 900 hours per year of instruction, while those in the eighth grade averaged about 1,000 hours.

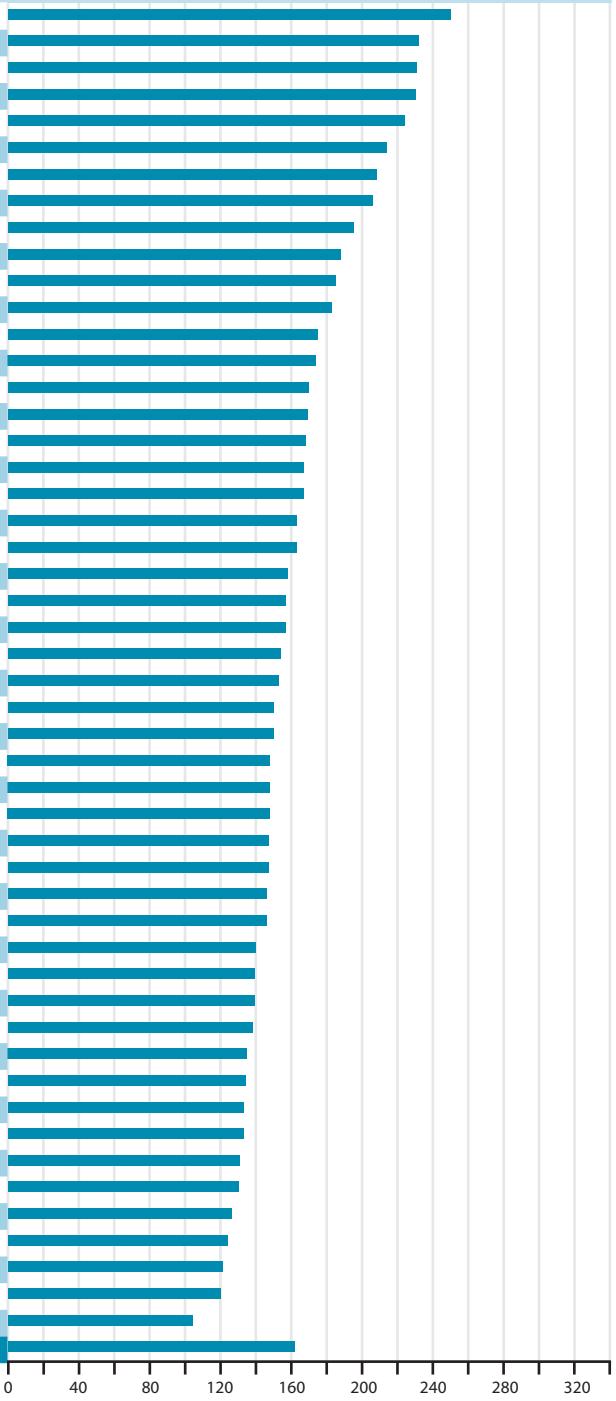
Teachers reported the weekly amount of instruction in mathematics. This information was combined with the data provided by principals to estimate yearly amounts of instructional time in mathematics for each TIMSS 2011 participant (second column in the exhibits). The countries are listed in the exhibits from most to least yearly instructional time in mathematics. It should be emphasized that at both the fourth and eighth grades, including the sixth

Exhibit 8.6: Instructional Time Spent on Mathematics

TIMSS 2011 Mathematics 4th Grade

Reported by Principals and Teachers

Country	Total Instructional Hours per Year		Hours per Year for Mathematics Instruction	
Portugal	r	940 (13.1)	r	250 (4.3)
Northern Ireland	r	970 (11.0)	s	232 (6.1)
Chile	r	1228 (22.6)	s	231 (6.7)
Australia		1008 (6.9)	s	230 (5.8)
Belgium (Flemish)	r	1010 (16.8)	r	224 (4.1)
Italy		1085 (12.6)		214 (3.9)
Singapore		1012 (0.0)		208 (3.2)
United States		1078 (7.3)	r	206 (4.6)
Netherlands	s	1074 (9.9)	s	195 (7.0)
England	r	970 (8.3)	s	188 (3.3)
Qatar		1068 (9.1)		185 (6.3)
Malta	r	891 (0.2)	r	183 (0.1)
Tunisia	r	963 (22.9)	r	175 (2.9)
Morocco	r	1040 (23.6)	s	174 (3.5)
Oman	s	999 (17.4)	s	170 (3.1)
Slovenia		684 (0.0)		169 (2.6)
New Zealand		925 (3.9)		168 (2.4)
Thailand	r	1201 (20.9)		167 (5.2)
Spain	r	884 (9.7)	r	167 (2.3)
Germany	r	863 (11.2)	r	163 (3.1)
Czech Republic		782 (8.2)		163 (3.0)
Hong Kong SAR	r	1059 (11.2)	r	158 (3.0)
Norway		817 (10.7)		157 (4.1)
Poland	r	764 (13.5)	r	157 (3.0)
United Arab Emirates	r	1025 (8.5)	s	154 (2.4)
Serbia		778 (18.5)		153 (2.1)
Ireland		854 (0.0)		150 (2.8)
Japan		891 (3.7)		150 (1.6)
Georgia	r	748 (18.7)	r	148 (3.9)
Hungary		760 (12.2)		148 (3.3)
Romania		796 (17.9)		148 (3.9)
Saudi Arabia	r	977 (19.4)	r	147 (6.6)
Slovak Republic		780 (8.8)		147 (1.4)
Austria		808 (6.9)		146 (2.1)
Iran, Islamic Rep. of		727 (11.2)		146 (3.9)
Kazakhstan		779 (10.6)		140 (2.7)
Finland		779 (9.8)		139 (2.5)
Armenia	r	851 (17.1)	r	139 (1.7)
Sweden	r	849 (11.3)	s	138 (3.8)
Yemen	r	831 (14.1)	r	135 (6.4)
Croatia		776 (19.4)		134 (2.3)
Chinese Taipei	r	989 (13.4)		133 (3.9)
Lithuania		649 (9.0)		133 (2.6)
Bahrain		964 (10.8)	r	131 (4.4)
Azerbaijan		804 (27.7)		130 (3.3)
Turkey		900 (19.3)		126 (2.5)
Denmark	r	863 (9.4)	s	124 (2.0)
Korea, Rep. of		789 (11.4)		121 (3.0)
Kuwait	r	928 (23.1)	r	120 (4.9)
Russian Federation	r	660 (8.0)		104 (1.0)
International Avg.		897 (2.0)		162 (0.5)



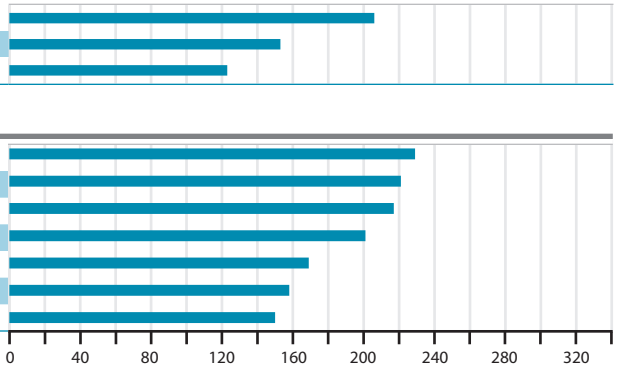
SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

Exhibit 8.6: Instructional Time Spent on Mathematics (Continued)

Country	Total Instructional Hours per Year		Hours per Year for Mathematics Instruction	
Sixth Grade Participants				
Honduras		1024 (16.9)	r	206 (7.2)
Botswana	s	1143 (23.2)	s	153 (5.8)
Yemen	r	831 (14.4)	r	123 (4.7)
Benchmarking Participants				
Quebec, Canada		916 (5.1)		229 (5.0)
North Carolina, US	r	1113 (22.9)	r	221 (13.5)
Florida, US	r	1073 (19.7)	s	217 (8.8)
Ontario, Canada		969 (7.4)	r	201 (4.1)
Alberta, Canada		1006 (8.8)	s	169 (3.2)
Dubai, UAE	r	993 (0.7)	s	158 (2.3)
Abu Dhabi, UAE	r	1033 (18.1)	s	150 (4.3)



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Total Instructional Hours per Year = Principal Reports of School Days per Year x Principal Reports of Instructional Hours per Day

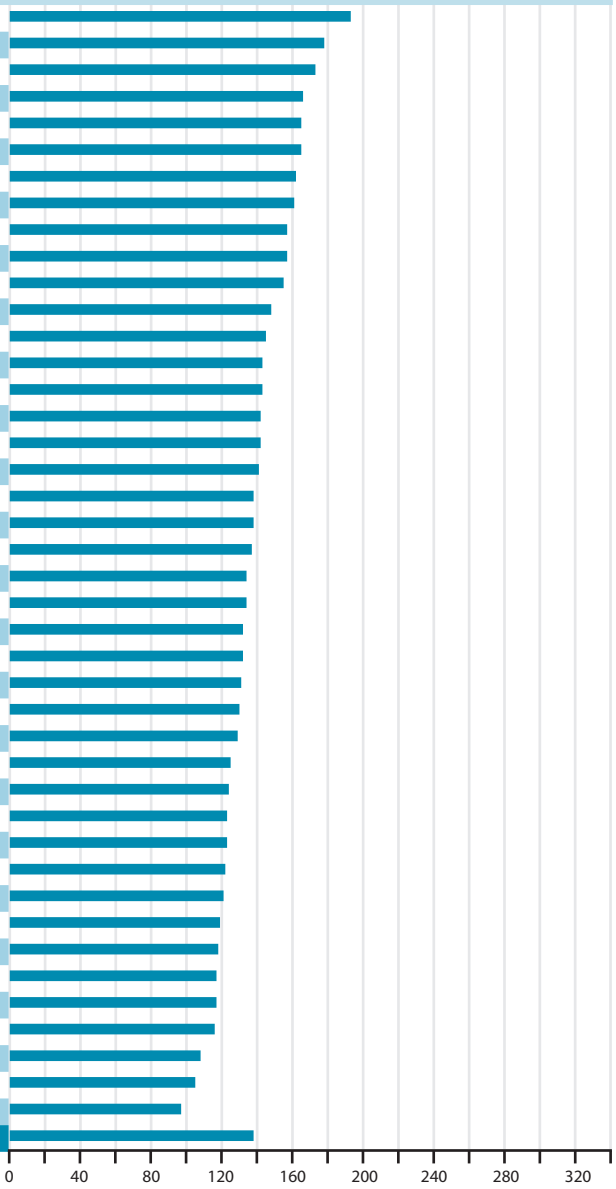
Hours per Year for Mathematics Instruction = (Teacher Reports of Weekly Mathematics Instructional Hours ÷ Principal Reports of School Days per Week) x Principal Reports of School Days per Year

Exhibit 8.7: Instructional Time Spent on Mathematics

TIMSS 2011 Mathematics 8th Grade

Reported by Principals and Teachers

Country	Total Instructional Hours per Year	Hours per Year for Mathematics Instruction
Chile	r 1245 (23.5)	r 193 (4.5)
Lebanon	r 1028 (12.7)	r 178 (3.9)
Indonesia	r 1494 (40.9)	r 173 (7.9)
Chinese Taipei	1153 (11.7)	166 (2.4)
Israel	r 1108 (14.1)	r 165 (3.0)
Ghana	r 1153 (18.9)	r 165 (6.8)
Qatar	1054 (1.3)	162 (3.6)
Oman	r 1044 (17.7)	r 161 (5.1)
United Arab Emirates	r 1046 (8.0)	r 157 (2.9)
United States	1114 (6.6)	s 157 (3.2)
Italy	1085 (9.4)	155 (2.5)
Morocco	r 1303 (24.9)	r 148 (2.1)
Romania	984 (15.5)	145 (3.7)
Armenia	r 979 (12.8)	r 143 (3.0)
Australia	1039 (7.2)	s 143 (3.5)
Russian Federation	882 (8.7)	142 (2.0)
Bahrain	1019 (1.1)	r 142 (2.5)
New Zealand	959 (4.4)	141 (1.8)
Hong Kong SAR	r 1026 (11.3)	r 138 (2.9)
Singapore	1106 (0.0)	138 (1.7)
Korea, Rep. of	1006 (12.1)	137 (1.8)
Palestinian Nat'l Auth.	918 (7.3)	134 (4.0)
Saudi Arabia	r 1050 (20.9)	r 134 (5.4)
Ukraine	901 (10.7)	132 (3.5)
Lithuania	898 (13.9)	132 (2.7)
Tunisia	r 1299 (25.4)	r 131 (3.0)
Jordan	1041 (11.9)	130 (3.8)
Thailand	r 1270 (15.1)	129 (4.3)
Norway	880 (6.3)	125 (3.4)
Iran, Islamic Rep. of	994 (15.9)	124 (3.3)
Malaysia	r 1198 (13.7)	r 123 (3.4)
Georgia	r 833 (10.8)	r 123 (3.3)
Macedonia, Rep. of	r 1023 (21.4)	s 122 (4.6)
Slovenia	798 (0.0)	121 (1.5)
Hungary	836 (12.2)	119 (1.9)
Syrian Arab Republic	811 (14.2)	r 118 (4.7)
Turkey	889 (16.7)	117 (1.8)
Kazakhstan	920 (9.9)	117 (3.2)
England	r 992 (8.4)	r 116 (2.1)
Japan	1016 (6.7)	108 (1.4)
Finland	934 (11.7)	105 (1.8)
Sweden	r 969 (13.4)	s 97 (2.2)
International Avg.	1031 (2.3)	138 (0.5)

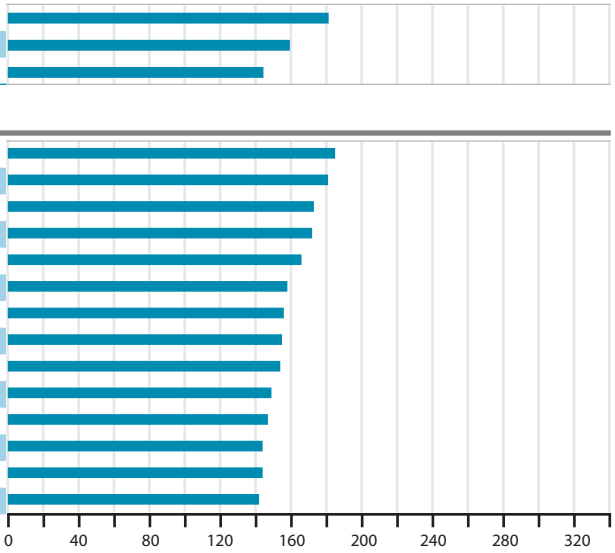


SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

Exhibit 8.7: Instructional Time Spent on Mathematics (Continued)

Country	Total Instructional Hours per Year		Hours per Year for Mathematics Instruction	
Ninth Grade Participants				
South Africa	r	1193 (11.3)	r	182 (6.7)
Honduras	r	1152 (27.1)	r	160 (5.7)
Botswana	r	1114 (20.1)	r	145 (3.9)
Benchmarking Participants				
North Carolina, US		1159 (16.0)	s	185 (9.7)
Ontario, Canada	r	971 (7.5)	r	181 (3.9)
Colorado, US		1148 (17.0)	r	173 (8.6)
California, US	r	1040 (15.2)	s	172 (8.0)
Alabama, US	r	1135 (16.0)	s	166 (8.9)
Abu Dhabi, UAE	r	1045 (16.6)	r	158 (5.8)
Alberta, Canada		1031 (10.0)		156 (4.2)
Dubai, UAE	r	1022 (1.5)	r	155 (3.6)
Massachusetts, US		1087 (13.6)	r	154 (5.4)
Indiana, US	r	1133 (14.9)	s	149 (6.9)
Quebec, Canada		913 (3.3)		147 (4.1)
Florida, US	r	1119 (17.0)	s	144 (7.4)
Connecticut, US		1071 (19.3)	r	144 (4.4)
Minnesota, US		1043 (14.8)	r	142 (7.5)



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Total Instructional Hours per Year = Principal Reports of School Days per Year x Principal Reports of Instructional Hours per Day

Hours per Year for Mathematics Instruction = (Teacher Reports of Weekly Mathematics Instructional Hours ÷ Principal Reports of School Days per Week) x Principal Reports of School Days per Year

and ninth grades, and the benchmarking participants, there was considerable variation across countries in the amount of time provided for mathematics instruction. Countries spend different amounts of time on total schooling, and allocate different amounts of the total time to mathematics instruction. Also, some countries are more efficient than others. Providing time for instruction is a necessary but not sufficient condition for student learning. The time allocated for instruction is a resource that needs to be used effectively, and efficiently.

Students Taught the TIMSS Mathematics Topics

The mathematics content and topic areas assessed in TIMSS 2011 are elaborated in the Mathematics Framework, with each topic area for the fourth and eighth grades presented as comprehensive lists of objectives. Developed collaboratively by the participating countries, the TIMSS topics do not represent the "least common denominator" but rather a forward-looking conception of mathematics teaching and learning.

Exhibit 8.8 presents teachers' reports about the TIMSS mathematics topics that actually had been taught to students in fourth grade classrooms either prior to or during the year of the assessment. The exhibit shows, for each TIMSS participant, the percentage of students whose teachers reported that the students had been taught each of the topics, averaged across all mathematics topics and across all topics within each mathematics content domain. The topics are shown on the second page of the exhibit. At the fourth grade, teachers were asked about a total of 18 topics, including eight in number, seven in geometric shapes and measures, and three in data and chance.

At the fourth grade, according to their teachers, 72 percent of students, on average, had been taught the TIMSS mathematics topics overall. There was considerable variation across countries, from 93 percent in Northern Ireland to 47 percent in Morocco. On average, the percentage of students taught various topics was similar across the three content domains, although somewhat lower for geometric shapes and measures (65%) than for both number and for data display (76%). In general, these patterns also were found at the sixth grade and for the benchmarking participants. However, including the fourth grade, there was considerable variation from topic to topic and from participant to participant.

Exhibit 8.9 presents teachers' reports about the TIMSS mathematics topics that actually had been taught to students in eighth grade mathematics classrooms either prior to or during the year of the assessment. The exhibit shows, for each TIMSS participant, the percentage of students whose teachers

reported that the students had been taught each of the topics, averaged across all mathematics topics and across all topics within each mathematics content domain. The topics are shown on the second page of the exhibit. At the eighth grade, teachers were asked about a total of 19 topics, including five in number, five in algebra, six in geometry, and three in data and chance.

At the eighth grade, on average, 80 percent of students had been taught the mathematics topics overall. Teachers' reports about the degree of implementation ranged from 95 percent in Macedonia and Romania to 52 percent in Norway. Almost all of the students, 98 percent, on average, had been taught the number topics by the eighth grade. The coverage for algebra and geometry was similar, with 75 percent of the students being taught the topics in each of those two content areas. The least instructional attention was given to the topics in data and chance, with 66 percent of students taught the topics in this domain, on average. It should be emphasized that there was considerable variation across countries, particularly in the percentages of students taught the data and chance topics. Also, although these patterns were similar for the benchmarking participants, according to their teachers smaller percentages of ninth grade students had been taught the topics, especially in Honduras.

National Research Coordinators were asked to indicate whether each of the TIMSS 2011 mathematics topics was included in their countries' intended curriculum through the fourth or eighth grade, and if so, whether the topics were intended to be taught to "all or almost all students" or "only the more able students." The results for the fourth and eighth grades are summarized in Exhibits 8.10 and 8.11. On average, across countries, the majority of the assessment topics were intended for all students—13 out of 18 at the fourth grade, and 16 out of 19 at the eighth grade.

At the fourth grade, the results varied topic by topic and country by country. However, of the eight number topics, on average, six were included in the curriculum and two were not; of the seven geometry topics, five were included and two were not; and of the three data display topics, two were included and one was not. At the eighth grade, there was also considerable variation across countries. However, on average, all five of the number topics were covered. In algebra, of the five topics, on average, four were included and one was not; and of the six geometry topics, five were included and one was not. In data and chance, approximately three-fourths of the countries appear to include this area in their curriculum and cover all three topics. On the other hand, Georgia, Indonesia, and the Ukraine did not include any of the data and chance topics in their curriculum.

Exhibit 8.8: Percentage of Students Taught the TIMSS Mathematics Topics*

TIMSS 2011 Mathematics 4th Grade

Reported by Teachers

Country	All Mathematics (18 Topics)	Number (8 Topics)	Geometric Shapes and Measures (7 Topics)	Data Display (3 Topics)
Armenia	70 (1.1)	63 (0.8)	72 (1.7)	81 (2.7)
Australia	r 87 (1.0)	r 85 (1.2)	r 86 (1.4)	r 94 (1.3)
Austria	59 (1.3)	56 (1.3)	67 (1.7)	48 (2.7)
Azerbaijan	58 (1.9)	61 (1.8)	60 (2.4)	49 (3.6)
Bahrain	80 (2.6)	85 (2.4)	73 (2.8)	84 (4.9)
Belgium (Flemish)	81 (1.1)	94 (0.8)	69 (1.5)	78 (2.5)
Chile	r 81 (1.1)	r 79 (1.3)	r 81 (1.4)	r 89 (2.7)
Chinese Taipei	82 (1.0)	94 (0.7)	69 (1.6)	82 (2.8)
Croatia	51 (0.6)	48 (0.4)	70 (1.0)	16 (2.2)
Czech Republic	54 (1.0)	53 (0.7)	53 (1.5)	57 (2.8)
Denmark	r 72 (1.1)	r 75 (1.3)	r 76 (1.7)	r 55 (3.5)
England	91 (0.9)	91 (0.8)	89 (1.5)	96 (1.2)
Finland	73 (1.1)	88 (1.1)	53 (2.2)	83 (2.2)
Georgia	59 (1.3)	59 (0.9)	49 (2.1)	81 (2.8)
Germany	67 (0.9)	64 (1.0)	63 (1.5)	86 (2.1)
Hong Kong SAR	78 (0.8)	83 (1.1)	66 (1.4)	95 (1.6)
Hungary	67 (0.9)	65 (0.6)	65 (1.4)	77 (2.8)
Iran, Islamic Rep. of	58 (1.5)	62 (1.6)	60 (1.4)	43 (3.8)
Ireland	78 (1.0)	87 (0.9)	63 (1.5)	87 (2.3)
Italy	79 (1.0)	85 (1.0)	71 (1.4)	84 (2.5)
Japan	79 (0.7)	95 (0.5)	63 (1.1)	73 (2.4)
Kazakhstan	– –	– –	– –	– –
Korea, Rep. of	76 (1.0)	93 (0.9)	63 (1.3)	65 (3.3)
Kuwait	92 (0.6)	99 (0.4)	82 (1.4)	97 (0.7)
Lithuania	82 (0.8)	86 (0.8)	71 (1.5)	98 (0.5)
Malta	76 (0.0)	87 (0.0)	58 (0.1)	88 (0.1)
Morocco	r 47 (1.3)	r 50 (1.5)	r 50 (2.0)	r 32 (4.0)
Netherlands	r 59 (1.7)	r 63 (1.8)	r 43 (2.5)	r 84 (2.5)
New Zealand	74 (1.0)	74 (1.1)	66 (1.6)	90 (1.8)
Northern Ireland	r 93 (0.6)	r 97 (0.6)	r 88 (1.3)	r 96 (1.5)
Norway	68 (1.3)	64 (1.4)	74 (1.8)	65 (3.7)
Oman	81 (0.6)	87 (0.7)	70 (1.0)	93 (0.9)
Poland	51 (1.0)	54 (1.1)	43 (1.2)	61 (3.0)
Portugal	89 (0.7)	85 (0.9)	89 (1.0)	99 (0.5)
Qatar	76 (1.4)	84 (1.6)	62 (2.0)	84 (2.4)
Romania	76 (1.3)	75 (1.1)	74 (1.7)	82 (2.7)
Russian Federation	– –	– –	– –	– –
Saudi Arabia	86 (1.0)	87 (1.1)	87 (1.8)	82 (2.2)
Serbia	65 (1.2)	65 (1.0)	69 (1.2)	60 (3.9)
Singapore	85 (0.5)	100 (0.2)	65 (1.1)	94 (1.0)
Slovak Republic	51 (1.1)	55 (0.9)	48 (1.2)	47 (2.9)
Slovenia	60 (0.6)	57 (0.7)	47 (1.0)	97 (0.8)
Spain	69 (1.0)	78 (1.6)	53 (1.9)	84 (2.7)
Sweden	r 53 (1.4)	r 61 (1.7)	r 38 (1.8)	r 69 (3.6)
Thailand	76 (1.5)	78 (1.8)	66 (2.1)	91 (2.1)
Tunisia	53 (0.9)	47 (0.6)	61 (1.5)	52 (3.2)
Turkey	81 (0.8)	92 (0.7)	62 (1.7)	97 (0.9)
United Arab Emirates	71 (1.0)	77 (1.0)	59 (1.3)	81 (1.5)
United States	r 87 (0.9)	r 90 (1.0)	r 82 (1.4)	r 93 (1.2)
Yemen	58 (1.6)	83 (1.9)	42 (2.3)	27 (3.3)
International Avg.	72 (0.2)	76 (0.2)	65 (0.2)	76 (0.4)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

* Percentage mostly taught before or in the assessment year averaged across topics.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A dash (–) indicates comparable data not available.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

Exhibit 8.8: Percentage of Students Taught the TIMSS Mathematics Topics* (Continued)

Country	All Mathematics (18 Topics)	Number (8 Topics)	Geometric Shapes and Measures (7 Topics)	Data Display (3 Topics)
Sixth Grade Participants				
Botswana	r 96 (0.8)	r 98 (0.5)	r 94 (1.4)	r 96 (1.5)
Honduras	75 (1.8)	93 (1.1)	64 (2.8)	50 (4.0)
Yemen	73 (1.4)	91 (1.1)	57 (2.0)	63 (4.0)
Benchmarking Participants				
Alberta, Canada	r 64 (1.7)	r 75 (1.8)	r 44 (2.6)	r 81 (2.8)
Ontario, Canada	78 (1.1)	72 (1.5)	77 (1.5)	98 (0.8)
Quebec, Canada	82 (1.0)	83 (1.1)	81 (1.3)	81 (3.0)
Abu Dhabi, UAE	71 (1.9)	77 (1.8)	59 (2.8)	81 (2.9)
Dubai, UAE	r 74 (0.9)	r 82 (1.0)	r 60 (1.3)	r 85 (1.8)
Florida, US	s 89 (1.0)	s 90 (1.0)	s 88 (1.4)	s 87 (3.5)
North Carolina, US	91 (1.2)	97 (0.8)	81 (2.7)	96 (2.2)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

TIMSS 2011 Mathematics Topics

A. Number

1) Concepts of whole numbers, including place value and ordering
2) Adding, subtracting, multiplying, and/or dividing with whole numbers
3) Concepts of fractions
4) Adding and subtracting with fractions
5) Concepts of decimals, including place value and ordering
6) Adding and subtracting with decimals
7) Number sentences
8) Number patterns

B. Geometric Shapes and Measures

1) Lines: measuring, estimating length of; parallel and perpendicular lines
2) Comparing and drawing angles
3) Using informal coordinate systems to locate points in a plane
4) Elementary properties of common geometric shapes
5) Reflections and rotations
6) Relationships between two-dimensional and three-dimensional shapes
7) Finding and estimating areas, perimeters, and volumes

C. Data Display

1) Reading data from tables, pictographs, bar graphs, or pie charts
2) Drawing conclusions from data displays
3) Displaying data using tables, pictographs, and bar graphs

Exhibit 8.9: Percentage of Students Taught the TIMSS Mathematics Topics*

TIMSS 2011 Mathematics 8th Grade

Reported by Teachers

Country	All Mathematics (19 Topics)	Number (5 Topics)	Algebra (5 Topics)	Geometry (6 Topics)	Data and Chance (3 Topics)
Armenia	93 (0.5)	100 (0.3)	99 (0.3)	84 (1.0)	86 (2.0)
Australia	r 80 (1.1)	r 97 (0.6)	s 71 (1.5)	r 75 (1.8)	r 73 (2.9)
Bahrain	90 (0.5)	100 (0.2)	90 (1.1)	83 (0.8)	88 (1.1)
Chile	73 (1.5)	98 (0.7)	60 (2.6)	72 (1.9)	56 (3.7)
Chinese Taipei	79 (0.5)	99 (0.3)	97 (0.6)	84 (1.2)	4 (1.5)
England	84 (1.3)	97 (0.7)	77 (1.8)	78 (2.0)	86 (2.1)
Finland	60 (0.7)	94 (0.7)	51 (1.3)	63 (1.2)	15 (2.2)
Georgia	72 (1.0)	100 (0.1)	76 (1.3)	52 (1.8)	58 (2.8)
Ghana	73 (1.3)	95 (1.0)	77 (1.5)	55 (2.4)	67 (2.7)
Hong Kong SAR	84 (0.9)	99 (0.5)	87 (1.7)	80 (1.7)	61 (2.2)
Hungary	87 (0.6)	100 (0.0)	77 (0.8)	90 (0.8)	76 (2.0)
Indonesia	69 (1.9)	97 (1.6)	84 (2.6)	61 (2.5)	12 (2.8)
Iran, Islamic Rep. of	80 (0.7)	100 (0.2)	74 (1.2)	81 (1.4)	58 (1.8)
Israel	89 (0.6)	99 (0.2)	94 (0.7)	79 (1.1)	82 (1.8)
Italy	82 (0.7)	100 (0.1)	61 (1.5)	91 (1.0)	71 (2.6)
Japan	91 (0.6)	99 (0.9)	92 (1.0)	93 (0.9)	75 (2.3)
Jordan	90 (0.7)	100 (0.1)	97 (0.8)	81 (1.4)	81 (1.9)
Kazakhstan	– –	– –	– –	– –	– –
Korea, Rep. of	92 (0.5)	100 (0.2)	91 (0.7)	92 (0.7)	81 (1.7)
Lebanon	69 (1.2)	96 (0.7)	64 (1.8)	62 (1.9)	49 (2.9)
Lithuania	70 (0.7)	100 (0.1)	59 (1.3)	59 (1.1)	62 (1.9)
Macedonia, Rep. of	r 95 (0.7)	r 100 (0.2)	s 96 (0.9)	r 96 (0.8)	r 85 (2.6)
Malaysia	84 (0.8)	98 (0.7)	73 (1.8)	93 (1.1)	63 (2.1)
Morocco	62 (0.9)	97 (0.5)	61 (1.6)	46 (1.1)	35 (2.2)
New Zealand	78 (1.0)	96 (0.7)	68 (1.6)	72 (1.6)	76 (2.3)
Norway	52 (1.1)	92 (1.3)	29 (2.1)	41 (1.8)	47 (2.6)
Oman	83 (0.6)	99 (0.2)	72 (1.2)	83 (0.9)	76 (2.1)
Palestinian Nat'l Auth.	76 (0.9)	100 (0.2)	62 (1.5)	63 (1.4)	85 (1.7)
Qatar	86 (0.8)	99 (0.3)	80 (1.2)	82 (1.5)	84 (1.3)
Romania	95 (0.4)	100 (0.0)	97 (0.5)	95 (0.6)	83 (1.6)
Russian Federation	– –	– –	– –	– –	– –
Saudi Arabia	92 (0.8)	99 (0.5)	85 (1.4)	93 (1.0)	88 (2.0)
Singapore	88 (0.4)	99 (0.4)	94 (0.7)	75 (0.8)	83 (1.2)
Slovenia	69 (0.7)	100 (0.1)	60 (1.3)	63 (0.9)	46 (1.9)
Sweden	r 60 (0.9)	r 97 (0.7)	r 47 (1.9)	r 44 (1.3)	r 51 (2.2)
Syrian Arab Republic	70 (1.4)	95 (1.1)	62 (2.1)	64 (2.0)	53 (3.0)
Thailand	77 (1.4)	98 (1.0)	62 (2.1)	80 (2.0)	65 (2.6)
Tunisia	68 (1.2)	97 (0.6)	49 (2.2)	67 (1.6)	54 (2.7)
Turkey	94 (0.5)	100 (0.2)	92 (0.9)	89 (1.1)	98 (0.9)
Ukraine	74 (0.7)	100 (0.3)	75 (1.0)	62 (1.1)	51 (2.4)
United Arab Emirates	79 (0.6)	98 (0.6)	70 (1.1)	74 (1.0)	72 (1.7)
United States	r 90 (0.6)	r 99 (0.3)	r 86 (1.1)	r 87 (1.2)	r 91 (1.0)
International Avg.	80 (0.1)	98 (0.1)	75 (0.2)	75 (0.2)	66 (0.3)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

* Percentage mostly taught before or in the assessment year averaged across topics.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A dash (–) indicates comparable data not available.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

Exhibit 8.9: Percentage of Students Taught the TIMSS Mathematics Topics* (Continued)

TIMSS 2011 Mathematics 8th Grade

Country	All Mathematics (19 Topics)	Number (5 Topics)	Algebra (5 Topics)	Geometry (6 Topics)	Data and Chance (3 Topics)
Ninth Grade Participants					
Botswana	77 (1.0)	97 (1.2)	71 (2.1)	76 (1.6)	59 (2.2)
Honduras	62 (1.7)	r 97 (1.0)	r 75 (2.4)	r 43 (2.9)	r 24 (3.9)
South Africa	83 (1.1)	93 (1.5)	81 (1.6)	83 (1.6)	68 (2.6)
Benchmarking Participants					
Alberta, Canada	78 (1.2)	98 (0.7)	62 (2.4)	75 (2.1)	77 (2.5)
Ontario, Canada	85 (0.8)	94 (0.9)	73 (1.9)	87 (1.3)	86 (2.0)
Quebec, Canada	81 (0.7)	99 (0.4)	67 (1.3)	86 (1.1)	64 (2.5)
Abu Dhabi, UAE	78 (1.0)	99 (0.5)	69 (1.8)	71 (1.8)	71 (3.0)
Dubai, UAE	80 (0.8)	99 (0.6)	74 (1.5)	73 (1.6)	69 (1.9)
Alabama, US	r 93 (1.1)	r 100 (0.0)	r 91 (1.7)	r 91 (2.2)	r 89 (3.2)
California, US	s 89 (2.4)	s 100 (0.4)	s 90 (2.9)	s 79 (4.9)	s 89 (3.1)
Colorado, US	r 87 (1.6)	r 98 (1.8)	r 79 (3.6)	r 82 (2.7)	r 92 (2.0)
Connecticut, US	r 89 (1.3)	r 100 (0.2)	r 73 (3.0)	r 91 (1.8)	r 91 (2.5)
Florida, US	r 92 (1.5)	r 100 (0.3)	s 91 (2.4)	r 86 (2.8)	r 92 (2.0)
Indiana, US	r 91 (1.6)	r 100 (0.3)	r 92 (1.8)	r 88 (2.9)	r 84 (4.1)
Massachusetts, US	r 94 (1.0)	r 100 (0.0)	r 90 (2.1)	r 92 (2.3)	r 92 (2.6)
Minnesota, US	r 91 (0.9)	r 100 (0.2)	r 95 (1.3)	r 80 (2.4)	r 91 (3.2)
North Carolina, US	r 96 (1.1)	r 100 (0.0)	r 96 (1.2)	r 91 (2.7)	r 98 (1.0)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

TIMSS 2011 Mathematics Topics

A. Number

1) Computing, estimating, or approximating with whole numbers
2) Concepts of fractions and computing with fractions
3) Concepts of decimals and computing with decimals
4) Representing, comparing, ordering, and computing with integers
5) Problem solving involving percents and proportions

B. Algebra

1) Numeric, algebraic, and geometric patterns or sequences
2) Simplifying and evaluating algebraic expressions
3) Simple linear equations and inequalities
4) Simultaneous (two variables) equations
5) Representation of functions as ordered pairs, tables, graphs, words, or equations

C. Geometry

1) Geometric properties of angles and geometric shapes
2) Congruent figures and similar triangles
3) Relationship between three-dimensional shapes and their two-dimensional representations
4) Using appropriate measurement formulas for perimeters, circumferences, areas, surface areas, and volumes
5) Points on the Cartesian plane
6) Translation, reflection, and rotation

D. Data and Chance

1) Reading and displaying data using tables, pictographs, bar graphs, pie charts, and line graphs
2) Interpreting data sets
3) Judging, predicting, and determining the chances of possible outcomes

Exhibit 8.10: Number of TIMSS Mathematics Topics Intended to Be Taught by the End of Fourth Grade

TIMSS 2011 Mathematics 4th Grade

Reported by National Research Coordinators

Country	All Mathematics (18 Topics)			Number (8 Topics)			Geometric Shapes and Measures (7 Topics)			Data Display (3 Topics)		
	Topics Taught to All or Almost All Students	Topics Taught to Only the More Able Students (Top Track)	Not Included in the Curriculum Through Grade 4	Topics Taught to All or Almost All Students	Topics Taught to Only the More Able Students (Top Track)	Not Included in the Curriculum Through Grade 4	Topics Taught to All or Almost All Students	Topics Taught to Only the More Able Students (Top Track)	Not Included in the Curriculum Through Grade 4	Topics Taught to All or Almost All Students	Topics Taught to Only the More Able Students (Top Track)	Not Included in the Curriculum Through Grade 4
Armenia	11	0	7	6	0	2	5	0	2	0	0	3
Australia	16	2	0	6	2	0	7	0	0	3	0	0
Austria	11	0	7	5	0	3	4	0	3	2	0	1
Azerbaijan	9	0	9	4	0	4	5	0	2	0	0	3
Bahrain	18	0	0	8	0	0	7	0	0	3	0	0
Belgium (Flemish)	17	0	1	8	0	0	6	0	1	3	0	0
Chile	9	0	9	3	0	5	5	0	2	1	0	2
Chinese Taipei	17	0	1	8	0	0	6	0	1	3	0	0
Croatia	13	0	5	4	0	4	6	0	1	3	0	0
Czech Republic	10	0	8	4	0	4	4	0	3	2	0	1
Denmark	10	0	8	2	0	6	5	0	2	3	0	0
England	17	1	0	7	1	0	7	0	0	3	0	0
Finland	13	0	5	5	0	3	5	0	2	3	0	0
Georgia	2	8	8	2	3	3	0	2	5	0	3	0
Germany	10	3	5	4	1	3	3	2	2	3	0	0
Hong Kong SAR	14	0	4	7	0	1	4	0	3	3	0	0
Hungary	13	0	5	4	0	4	6	0	1	3	0	0
Iran, Islamic Rep. of	17	0	1	8	0	0	6	0	1	3	0	0
Ireland	17	0	1	7	0	1	7	0	0	3	0	0
Italy	8	3	7	5	1	2	1	1	5	2	1	0
Japan	17	0	1	8	0	0	6	0	1	3	0	0
Kazakhstan	8	0	10	4	0	4	4	0	3	0	0	3
Korea, Rep. of	15	0	3	8	0	0	4	0	3	3	0	0
Kuwait	18	0	0	8	0	0	7	0	0	3	0	0
Lithuania	11	3	4	5	1	2	3	2	2	3	0	0
Malta	17	0	1	8	0	0	6	0	1	3	0	0
Morocco	11	0	7	5	0	3	4	0	3	2	0	1
Netherlands	7	0	11	3	0	5	2	0	5	2	0	1
New Zealand	15	2	1	7	1	0	6	1	0	2	0	1
Northern Ireland	18	0	0	8	0	0	7	0	0	3	0	0
Norway	14	0	4	5	0	3	7	0	0	2	0	1
Oman	15	0	3	7	0	1	5	0	2	3	0	0
Poland	6	0	12	3	0	5	3	0	4	0	0	3
Portugal	17	0	1	7	0	1	7	0	0	3	0	0
Qatar	14	2	2	8	0	0	3	2	2	3	0	0
Romania	13	0	5	6	0	2	4	0	3	3	0	0
Russian Federation	6	1	11	2	1	5	4	0	3	0	0	3
Saudi Arabia	18	0	0	8	0	0	7	0	0	3	0	0
Serbia	8	1	9	4	1	3	4	0	3	0	0	3
Singapore	16	0	2	8	0	0	5	0	2	3	0	0
Slovak Republic	7	0	11	4	0	4	2	0	5	1	0	2
Slovenia	10	1	7	3	1	4	4	0	3	3	0	0
Spain	10	0	8	4	0	4	4	0	3	2	0	1
Sweden	16	0	2	7	0	1	6	0	1	3	0	0
Thailand	18	0	0	8	0	0	7	0	0	3	0	0
Tunisia	7	0	11	4	0	4	2	0	5	1	0	2
Turkey	16	0	2	7	0	1	6	0	1	3	0	0
United Arab Emirates	18	0	0	8	0	0	7	0	0	3	0	0
United States	17	0	1	8	0	0	7	0	0	2	0	1
Yemen	14	0	4	8	0	0	3	0	4	3	0	0
International Avg.	13	1	4	6	0	2	5	0	2	2	0	1

Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

TIMSS & PIRLS International Study Center
Lynch School of Education, Boston College

Exhibit 8.10: Number of TIMSS Mathematics Topics Intended to Be Taught by the End of Fourth Grade (Continued)

TIMSS 2011 Mathematics 4th Grade

Country	All Mathematics (18 Topics)			Number (8 Topics)			Geometric Shapes and Measures (7 Topics)			Data Display (3 Topics)		
	Topics Taught to All or Almost All Students	Topics Taught to Only the More Able Students (Top Track)	Not Included in the Curriculum Through Grade 4	Topics Taught to All or Almost All Students	Topics Taught to Only the More Able Students (Top Track)	Not Included in the Curriculum Through Grade 4	Topics Taught to All or Almost All Students	Topics Taught to Only the More Able Students (Top Track)	Not Included in the Curriculum Through Grade 4	Topics Taught to All or Almost All Students	Topics Taught to Only the More Able Students (Top Track)	Not Included in the Curriculum Through Grade 4
Sixth Grade Participants												
Botswana	8	0	10	8	0	0	0	0	7	0	0	3
Honduras	18	0	0	8	0	0	7	0	0	3	0	0
Benchmarking Participants												
Alberta, Canada	15	0	3	7	0	1	5	0	2	3	0	0
Ontario, Canada	17	0	1	7	0	1	7	0	0	3	0	0
Quebec, Canada	10	3	5	4	1	3	5	0	2	1	2	0
Abu Dhabi, UAE	17	0	1	8	0	0	7	0	0	2	0	1
Dubai, UAE	18	0	0	8	0	0	7	0	0	3	0	0
Florida, US	15	0	3	7	0	1	5	0	2	3	0	0
North Carolina, US	16	0	2	8	0	0	5	0	2	3	0	0

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 8.11: Number of TIMSS Mathematics Topics Intended to Be Taught by the End of Eighth Grade

TIMSS 2011 Mathematics 8th Grade

Reported by National Research Coordinators

Country	All Mathematics (19 Topics)			Number (5 Topics)			Algebra (5 Topics)		
	Topics Taught to All or Almost All Students	Topics Taught to Only the More Able Students (Top Track)	Not Included in the Curriculum Through Grade 8	Topics Taught to All or Almost All Students	Topics Taught to Only the More Able Students (Top Track)	Not Included in the Curriculum Through Grade 8	Topics Taught to All or Almost All Students	Topics Taught to Only the More Able Students (Top Track)	Not Included in the Curriculum Through Grade 8
Armenia	19	0	0	5	0	0	5	0	0
Australia	18	0	1	5	0	0	4	0	1
Bahrain	19	0	0	5	0	0	5	0	0
Chile	17	0	2	5	0	0	5	0	0
Chinese Taipei	15	0	4	5	0	0	5	0	0
England	18	1	0	5	0	0	4	1	0
Finland	19	0	0	5	0	0	5	0	0
Georgia	9	9	1	4	1	0	3	2	0
Ghana	19	0	0	5	0	0	5	0	0
Hong Kong SAR	14	4	1	5	0	0	4	0	1
Hungary	18	0	1	5	0	0	4	0	1
Indonesia	1	4	14	0	0	5	0	3	2
Iran, Islamic Rep. of	19	0	0	5	0	0	5	0	0
Israel	19	0	0	5	0	0	5	0	0
Italy	17	0	2	5	0	0	3	0	2
Japan	19	0	0	5	0	0	5	0	0
Jordan	19	0	0	5	0	0	5	0	0
Kazakhstan	19	0	0	5	0	0	5	0	0
Korea, Rep. of	19	0	0	5	0	0	5	0	0
Lebanon	16	2	1	5	0	0	5	0	0
Lithuania	15	0	4	5	0	0	4	0	1
Macedonia, Rep. of	18	1	0	5	0	0	4	1	0
Malaysia	14	0	5	5	0	0	3	0	2
Morocco	15	0	4	5	0	0	3	0	2
New Zealand	13	4	2	5	0	0	0	3	2
Norway	12	0	7	4	0	1	1	0	4
Oman	16	0	3	5	0	0	3	0	2
Palestinian Nat'l Auth.	19	0	0	5	0	0	5	0	0
Qatar	14	0	5	2	0	3	4	0	1
Romania	19	0	0	5	0	0	5	0	0
Russian Federation	19	0	0	5	0	0	5	0	0
Saudi Arabia	19	0	0	5	0	0	5	0	0
Singapore	17	0	2	5	0	0	5	0	0
Slovenia	15	0	4	5	0	0	3	0	2
Sweden	15	0	4	5	0	0	4	0	1
Syrian Arab Republic	16	0	3	5	0	0	5	0	0
Thailand	19	0	0	5	0	0	5	0	0
Tunisia	7	0	12	1	0	4	2	0	3
Turkey	18	0	1	5	0	0	4	0	1
Ukraine	14	0	5	5	0	0	5	0	0
United Arab Emirates	19	0	0	5	0	0	5	0	0
United States	18	1	0	5	0	0	4	1	0
International Avg.	16	1	2	5	0	0	4	0	1

Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 8.11: Number of TIMSS Mathematics Topics Intended to Be Taught by the End of Eighth Grade (Continued)

Country	Geometry (6 Topics)			Data and Chance (3 Topics)		
	Topics Taught to All or Almost All Students	Topics Taught to Only the More Able Students (Top Track)	Not Included in the Curriculum Through Grade 8	Topics Taught to All or Almost All Students	Topics Taught to Only the More Able Students (Top Track)	Not Included in the Curriculum Through Grade 8
Armenia	6	0	0	3	0	0
Australia	6	0	0	3	0	0
Bahrain	6	0	0	3	0	0
Chile	4	0	2	3	0	0
Chinese Taipei	4	0	2	1	0	2
England	6	0	0	3	0	0
Finland	6	0	0	3	0	0
Georgia	2	3	1	0	3	0
Ghana	6	0	0	3	0	0
Hong Kong SAR	4	2	0	1	2	0
Hungary	6	0	0	3	0	0
Indonesia	1	1	4	0	0	3
Iran, Islamic Rep. of	6	0	0	3	0	0
Israel	6	0	0	3	0	0
Italy	6	0	0	3	0	0
Japan	6	0	0	3	0	0
Jordan	6	0	0	3	0	0
Kazakhstan	6	0	0	3	0	0
Korea, Rep. of	6	0	0	3	0	0
Lebanon	4	2	0	2	0	1
Lithuania	4	0	2	2	0	1
Macedonia, Rep. of	6	0	0	3	0	0
Malaysia	5	0	1	1	0	2
Morocco	5	0	1	2	0	1
New Zealand	5	1	0	3	0	0
Norway	4	0	2	3	0	0
Oman	5	0	1	3	0	0
Palestinian Nat'l Auth.	6	0	0	3	0	0
Qatar	5	0	1	3	0	0
Romania	6	0	0	3	0	0
Russian Federation	6	0	0	3	0	0
Saudi Arabia	6	0	0	3	0	0
Singapore	5	0	1	2	0	1
Slovenia	6	0	0	1	0	2
Sweden	3	0	3	3	0	0
Syrian Arab Republic	4	0	2	2	0	1
Thailand	6	0	0	3	0	0
Tunisia	2	0	4	2	0	1
Turkey	6	0	0	3	0	0
Ukraine	4	0	2	0	0	3
United Arab Emirates	6	0	0	3	0	0
United States	6	0	0	3	0	0
International Avg.	5	0	1	2	0	0

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 8.11: Number of TIMSS Mathematics Topics Intended to Be Taught by the End of Eighth Grade (Continued)

TIMSS 2011 Mathematics 8th Grade

Country	All Mathematics (19 Topics)			Number (5 Topics)			Algebra (5 Topics)		
	Topics Taught to All or Almost All Students	Topics Taught to Only the More Able Students (Top Track)	Not Included in the Curriculum Through Grade 8	Topics Taught to All or Almost All Students	Topics Taught to Only the More Able Students (Top Track)	Not Included in the Curriculum Through Grade 8	Topics Taught to All or Almost All Students	Topics Taught to Only the More Able Students (Top Track)	Not Included in the Curriculum Through Grade 8
Ninth Grade Participants									
Botswana	15	0	4	5	0	0	4	0	1
Honduras	19	0	0	5	0	0	5	0	0
South Africa	19	0	0	5	0	0	5	0	0
Benchmarking Participants									
Alberta, Canada	18	0	1	5	0	0	4	0	1
Ontario, Canada	18	0	1	5	0	0	4	0	1
Quebec, Canada	16	0	3	5	0	0	3	0	2
Abu Dhabi, UAE	18	0	1	5	0	0	5	0	0
Dubai, UAE	19	0	0	5	0	0	5	0	0
Alabama, US	19	0	0	5	0	0	5	0	0
California, US	18	1	0	5	0	0	4	1	0
Colorado, US	17	0	2	5	0	0	4	0	1
Connecticut, US	19	0	0	5	0	0	5	0	0
Florida, US	19	0	0	5	0	0	5	0	0
Indiana, US	19	0	0	5	0	0	5	0	0
Massachusetts, US	18	0	1	5	0	0	4	0	1
Minnesota, US	19	0	0	5	0	0	5	0	0
North Carolina, US	18	0	1	5	0	0	4	0	1

Country	Geometry (6 Topics)			Data and Chance (3 Topics)		
	Topics Taught to All or Almost All Students	Topics Taught to Only the More Able Students (Top Track)	Not Included in the Curriculum Through Grade 8	Topics Taught to All or Almost All Students	Topics Taught to Only the More Able Students (Top Track)	Not Included in the Curriculum Through Grade 8
Ninth Grade Participants						
Botswana	5	0	1	1	0	2
Honduras	6	0	0	3	0	0
South Africa	6	0	0	3	0	0
Benchmarking Participants						
Alberta, Canada	6	0	0	3	0	0
Ontario, Canada	6	0	0	3	0	0
Quebec, Canada	5	0	1	3	0	0
Abu Dhabi, UAE	5	0	1	3	0	0
Dubai, UAE	6	0	0	3	0	0
Alabama, US	6	0	0	3	0	0
California, US	6	0	0	3	0	0
Colorado, US	5	0	1	3	0	0
Connecticut, US	6	0	0	3	0	0
Florida, US	6	0	0	3	0	0
Indiana, US	6	0	0	3	0	0
Massachusetts, US	6	0	0	3	0	0
Minnesota, US	6	0	0	3	0	0
North Carolina, US	6	0	0	3	0	0

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Collaborate to Improve Teaching

Part of creating a school learning environment focused on academic success involves a staff that collaborates on curricular activities. For example, a study including a comprehensive theoretical review and a meta-analysis of studies about professional communities indicated a small but positive effect of professional communities on student achievement (Lomos, Roelande, & Bosker, 2011). Because teacher collaboration with colleagues is important in building a professional community, TIMSS 2011 included the Collaborate to Improve Teaching scale. Although the idea of teacher collegiality and collaboration can involve a variety of theoretical perspectives and terms, the TIMSS 2011 scale was designed to focus on the idea of collaboration for the purpose of improving teaching. Therefore, the scale was based on how often teachers interacted with other teachers regarding each of five areas:

- Discuss how to teach a particular topic;
- Collaborate in planning and preparing instructional materials;
- Share what I have learned about my teaching experiences;
- Visit another classroom to learn more about teaching; and
- Work together to try out new ideas.

Students were scored according to their teachers responses, with **Very Collaborative** teachers having interactions with other teachers at least "one to three times per week" in each of three of the five areas and "two or three times per month" in each of the other two, on average.

Exhibit 8.12 presents the results for the fourth grade. In general, most mathematics teachers of fourth grade students reported a high degree of collaboration with other teachers with the goal of improving teaching and learning. Internationally, on average, about one-third of the fourth grade students (36%) had **Very Collaborative** teachers. Another 53 percent of students, on average, had teachers that reported being **Collaborative** (e.g., interacting two or three times a month for all areas). Few fourth grade students (11%, on average) had mathematics teachers that were only **Somewhat Collaborative** (e.g., never or almost never interacting in three of the five areas).

Looking across countries at the fourth and sixth grades as well as the benchmarking participants, it is clear that there are differences from country to country. However, primarily these differences were between the percentages

of students with **Very Collaborative** and **Collaborative** teachers, and they had very similar achievement, on average (493 and 491, respectively).

Exhibit 8.13 presents the teacher collaboration results for the eighth grade. The mathematics teachers of eighth grade students reported a degree of collaboration with other teachers comparable to their colleagues at the fourth grade. More than one-quarter of the eighth grade students (28%) had **Very Collaborative** teachers and another 57 percent had **Collaborative** teachers, with 15 percent having only **Somewhat Collaborative** teachers. Just like at the fourth grade, the eighth grade students had essentially the same average mathematics achievement whether their teachers were **Very Collaborative** or **Collaborative** (467 and 468, respectively). In general, the ninth grade and benchmarking students also had teachers that reported a considerable amount of collaboration with other teachers. According to TIMSS 2011 reports from mathematics teachers, almost all students have the benefit of teachers who collaborate with other teachers to improve instruction.

Instruction to Engage Students in Learning

Historically, educational studies, including TIMSS, have struggled to link student achievement to instructional activities. Typically, teachers are asked to report how frequently they use various instruction activities and strategies, and such information can be very useful. However, in light of the growing body of evidence about the complexities of teaching and learning, researchers are beginning to understand these lists of activities cannot be used as proxies for the characteristics of good teaching.

To help build a better bridge between curriculum and instruction, TIMSS 2011 collected information about the concept of student content engagement as described by McLaughlin et al. (2005). According to this work, supported by the US National Center for Education Statistics, student content engagement focuses on the importance of the activity that brings the student and the subject matter content together. Engagement refers to the cognitive interaction between the student and instructional content, and may take the form of listening to the teacher or providing an explanation of a problem solution. It is the student's in-the-moment cognitive interaction with instructional content.

To measure aspects of student content engagement, TIMSS 2011 developed both a teacher scale, called the Engaging Students in Learning scale, and a student scale called the Engaged in Mathematics Lessons scale.

Exhibit 8.14 presents the fourth grade results for the Engaging Students in Learning scale. The scale contains six items related to teachers' instructional practices intended to interest students and reinforce learning:

- Summarizing the lesson's learning goals;
- Relating the lesson to students' daily lives;
- Questioning to elicit reasons and explanations;
- Encouraging students to show improvement;
- Praising students for good effort; and
- Bringing interesting materials to class.

Students were categorized according to their teachers' responses, with **Most Lessons** corresponding to teachers who used three of the six practices in "every or almost every lesson" and the other three in "about half the lessons," on average.

Many fourth grade students, 69 percent on average, internationally, had mathematics teachers that made efforts to engage them in instruction by using a variety of strategies in **Most Lessons**, and most of the remaining students had teachers that used engaging instructional practices in **About Half the Lessons** (with a few exceptions). Across the fourth grade, sixth grade, and benchmarking participants, students often had slightly higher average mathematics achievement if their teachers used engaging instruction in **Most Lessons** rather than **About Half the Lessons**.

Exhibit 8.15 presents the eighth grade results based on a somewhat shorter Engaging Students in Learning scale. At the eighth grade, two items were removed from the scale because relatively small percentages of students had teachers that frequently related lessons to students' daily lives, and even smaller percentages had teachers that routinely brought interesting materials to class (see exhibit 8.16). Perhaps eighth grade teachers should make greater efforts to make mathematics relevant to students' daily lives and provide interesting materials, especially in light of the drop by the eighth grade in students' liking mathematics learning. On the other hand, teachers in some of the highest achieving countries reported the least use of these instructional practices.

Based on the shorter four-item scale, on average, 80 percent of the eighth grade students had teachers that reported using engaging practices in most lessons, and almost all of the rest had teachers that reported using engaging practices in about half of the lessons. Across the eighth grade, ninth grade,

Exhibit 8.12: Collaborate to Improve Teaching

Reported by Teachers

Students were scored according to their teachers' responses to how often they interacted with other teachers in each of five teaching areas on the *Collaborate to Improve Teaching* scale. Students with **Very Collaborative** teachers had a score on the scale of at least 11.0, which corresponds to their teachers having interactions with other teachers at least "one to three times per week" in each of three of the five areas and "two or three times per month" in each of the other two, on average. Students with **Somewhat Collaborative** teachers had a score no higher than 7.3, which corresponds to their teachers interacting with other teachers "never or almost never" in each of three of the five areas and "two or three times per month" in each of the other two, on average. All other students had **Collaborative** teachers.

Country	Very Collaborative		Collaborative		Somewhat Collaborative		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Slovenia	74 (3.5)	513 (2.5)	25 (3.4)	512 (4.0)	2 (0.8)	~ ~	11.8 (0.14)
Kuwait	71 (3.1)	340 (4.5)	26 (3.1)	349 (5.6)	3 (1.0)	330 (17.2)	11.4 (0.12)
Romania	68 (3.8)	480 (7.0)	31 (3.9)	482 (8.0)	1 (0.6)	~ ~	11.4 (0.12)
Kazakhstan	59 (3.9)	498 (5.4)	41 (4.0)	508 (7.8)	0 (0.3)	~ ~	11.1 (0.08)
Armenia	57 (3.8)	456 (4.6)	42 (3.9)	450 (5.1)	1 (0.9)	~ ~	11.1 (0.11)
Qatar	54 (4.6)	404 (7.4)	40 (4.6)	420 (7.3)	6 (2.0)	441 (29.5)	10.7 (0.16)
Oman	54 (2.9)	391 (3.6)	44 (3.0)	380 (4.4)	2 (0.6)	~ ~	10.8 (0.07)
Serbia	52 (4.0)	523 (3.7)	46 (4.0)	508 (4.6)	2 (0.9)	~ ~	10.8 (0.13)
Korea, Rep. of	51 (3.7)	610 (2.8)	46 (3.5)	600 (2.7)	4 (1.8)	593 (5.3)	10.6 (0.16)
Azerbaijan	49 (3.9)	462 (8.0)	46 (3.9)	468 (7.6)	5 (1.9)	437 (31.1)	10.6 (0.13)
United States	49 (2.6)	544 (2.4)	40 (2.5)	544 (3.5)	11 (1.8)	533 (6.7)	10.4 (0.14)
Slovak Republic	49 (3.4)	510 (5.4)	48 (3.4)	506 (4.1)	3 (1.1)	452 (18.7)	10.7 (0.11)
England	47 (4.0)	541 (6.0)	44 (4.0)	550 (5.4)	9 (1.9)	538 (13.3)	10.5 (0.14)
Portugal	45 (4.8)	532 (6.1)	50 (4.9)	532 (4.2)	5 (1.4)	541 (8.1)	10.6 (0.18)
Turkey	44 (3.3)	468 (8.2)	46 (2.9)	469 (7.0)	9 (1.8)	475 (9.3)	10.2 (0.12)
Australia r	43 (3.7)	525 (5.8)	44 (3.9)	517 (5.7)	12 (2.6)	509 (8.0)	10.3 (0.15)
Hungary	43 (4.0)	516 (6.2)	53 (3.9)	513 (5.7)	4 (1.1)	518 (10.7)	10.5 (0.11)
United Arab Emirates	42 (2.7)	441 (4.0)	55 (2.8)	429 (3.4)	3 (0.7)	459 (15.3)	10.5 (0.07)
Croatia	41 (3.8)	493 (3.4)	57 (3.8)	489 (2.6)	2 (0.9)	~ ~	10.5 (0.11)
New Zealand	41 (3.2)	487 (4.9)	54 (3.0)	487 (3.8)	6 (1.4)	473 (12.0)	10.4 (0.11)
Chile	39 (4.2)	468 (4.9)	40 (4.4)	461 (5.5)	22 (3.5)	451 (9.4)	9.7 (0.19)
Thailand	38 (3.5)	459 (7.6)	57 (3.8)	458 (6.2)	5 (1.7)	456 (13.2)	10.5 (0.15)
Spain	38 (3.8)	492 (3.6)	51 (3.8)	479 (4.3)	11 (2.3)	467 (6.9)	9.9 (0.17)
Lithuania	38 (3.3)	536 (4.2)	57 (3.3)	533 (3.8)	5 (1.5)	531 (10.4)	10.3 (0.10)
Georgia	36 (3.2)	454 (6.9)	60 (3.2)	451 (4.4)	4 (1.1)	412 (30.6)	10.4 (0.12)
Norway	36 (4.3)	493 (4.4)	53 (4.3)	497 (3.4)	12 (3.2)	490 (13.3)	10.0 (0.17)
Bahrain	35 (4.6)	448 (6.2)	57 (4.5)	430 (4.7)	8 (2.4)	426 (14.4)	10.2 (0.15)
Japan	35 (3.7)	590 (2.5)	59 (4.0)	585 (2.4)	6 (1.9)	573 (7.4)	10.2 (0.09)
Sweden r	33 (4.1)	502 (4.4)	53 (4.3)	503 (2.8)	13 (3.4)	517 (6.3)	9.8 (0.21)
Poland	32 (3.0)	476 (3.4)	66 (3.1)	484 (2.8)	2 (0.9)	~ ~	10.3 (0.08)
Russian Federation	31 (3.8)	540 (6.8)	67 (4.0)	543 (4.0)	1 (0.8)	~ ~	10.3 (0.08)
Iran, Islamic Rep. of	31 (3.0)	429 (7.1)	60 (2.9)	429 (4.7)	9 (2.0)	447 (10.7)	10.0 (0.14)
Singapore	30 (2.4)	604 (6.3)	64 (2.5)	608 (3.8)	6 (1.2)	580 (10.3)	9.9 (0.08)
Italy	26 (3.2)	512 (5.2)	59 (3.3)	509 (3.8)	15 (2.1)	500 (6.9)	9.4 (0.14)
Finland	26 (2.8)	551 (4.8)	60 (2.7)	545 (2.6)	14 (1.9)	541 (7.2)	9.6 (0.13)
Germany	23 (2.9)	532 (4.0)	59 (3.7)	525 (2.8)	18 (2.6)	535 (4.8)	9.4 (0.12)
Chinese Taipei	23 (3.5)	593 (4.3)	57 (3.9)	592 (2.7)	20 (3.6)	587 (4.7)	9.4 (0.18)
Northern Ireland r	22 (4.1)	562 (6.5)	55 (4.8)	563 (4.3)	23 (3.6)	565 (8.2)	9.4 (0.21)
Austria	21 (3.3)	500 (7.3)	54 (3.8)	509 (3.0)	24 (3.1)	515 (4.1)	9.1 (0.15)
Belgium (Flemish)	20 (2.5)	549 (3.4)	62 (3.5)	548 (2.5)	18 (2.8)	555 (4.7)	9.3 (0.14)
Malta	18 (0.1)	505 (2.9)	50 (0.1)	497 (1.8)	31 (0.1)	489 (2.6)	8.6 (0.01)
Netherlands r	18 (3.9)	539 (5.6)	57 (4.6)	540 (3.1)	26 (4.5)	537 (4.3)	9.0 (0.19)
Denmark	17 (2.9)	544 (5.0)	66 (3.4)	539 (2.7)	16 (2.5)	542 (6.3)	9.3 (0.14)
Czech Republic	16 (2.7)	502 (4.9)	71 (3.7)	513 (3.0)	13 (3.1)	509 (6.0)	9.4 (0.15)
Ireland	16 (2.6)	534 (8.9)	59 (3.6)	523 (3.0)	25 (3.1)	534 (4.5)	8.8 (0.14)
Saudi Arabia	16 (2.9)	415 (8.8)	74 (3.4)	407 (5.4)	11 (2.6)	427 (24.7)	9.4 (0.14)
Morocco	15 (2.9)	361 (16.2)	43 (4.3)	345 (6.9)	43 (4.3)	324 (7.1)	8.1 (0.23)
Hong Kong SAR	14 (2.7)	610 (6.3)	75 (3.1)	598 (4.1)	12 (2.7)	617 (10.4)	9.2 (0.13)
Tunisia	14 (2.9)	368 (11.0)	57 (4.3)	360 (5.7)	29 (3.6)	353 (7.4)	8.5 (0.17)
Yemen	12 (2.9)	248 (15.5)	57 (4.2)	258 (7.5)	31 (3.9)	228 (10.8)	8.6 (0.18)
International Avg.	36 (0.5)	493 (0.9)	53 (0.5)	491 (0.7)	11 (0.3)	488 (2.0)	

Centerpoint of scale set at 10.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 8.12: Collaborate to Improve Teaching (Continued)

Country	Very Collaborative		Collaborative		Somewhat Collaborative		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Sixth Grade Participants							
Botswana	47 (4.2)	418 (5.2)	43 (4.3)	419 (6.8)	10 (2.8)	439 (21.7)	10.6 (0.21)
Honduras	35 (4.8)	391 (14.1)	51 (4.6)	398 (5.2)	14 (2.4)	405 (9.3)	9.9 (0.23)
Yemen	14 (2.7)	339 (14.9)	58 (4.6)	360 (6.4)	28 (4.3)	330 (12.7)	8.7 (0.17)
Benchmarking Participants							
North Carolina, US	64 (6.1)	550 (5.8)	33 (5.4)	558 (5.8)	4 (2.0)	555 (12.5)	11.1 (0.25)
Dubai, UAE	57 (4.3)	477 (5.0)	41 (4.3)	462 (8.3)	2 (0.3)	~ ~	11.0 (0.08)
Florida, US r	53 (4.9)	547 (5.0)	39 (4.9)	543 (5.6)	7 (3.0)	523 (16.8)	10.7 (0.22)
Abu Dhabi, UAE	41 (4.2)	417 (7.6)	58 (4.3)	419 (6.7)	1 (0.8)	~ ~	10.7 (0.14)
Alberta, Canada r	32 (4.0)	506 (4.5)	54 (4.8)	506 (4.2)	14 (3.2)	509 (4.0)	9.8 (0.19)
Ontario, Canada	26 (3.4)	516 (4.9)	57 (3.9)	520 (3.8)	17 (2.9)	520 (5.9)	9.7 (0.18)
Quebec, Canada	21 (4.1)	530 (4.8)	62 (4.6)	533 (3.3)	18 (3.1)	535 (4.9)	9.3 (0.17)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

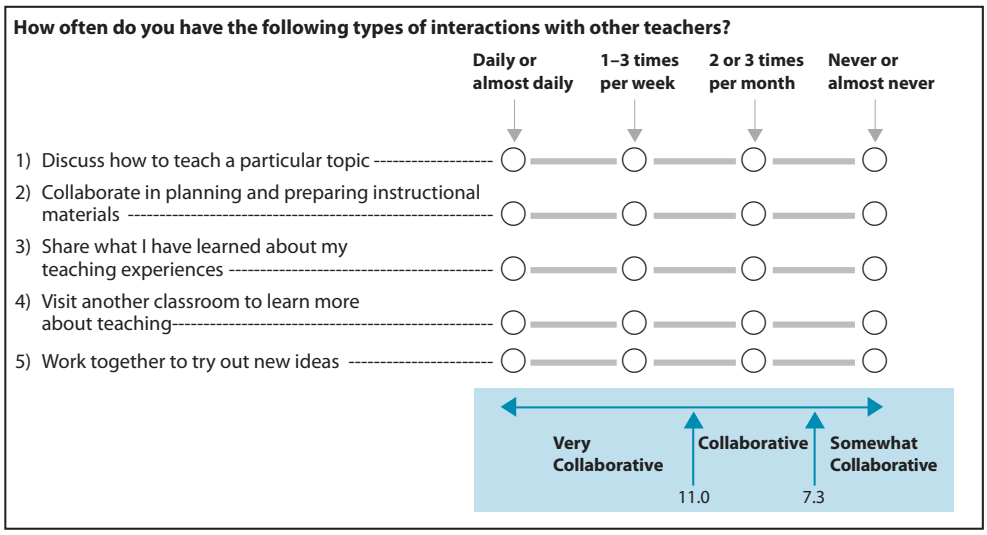


Exhibit 8.13: Collaborate to Improve Teaching

TIMSS 2011 8th Grade Mathematics

Reported by Teachers

Students were scored according to their teachers' responses to how often they interacted with other teachers in each of five teaching areas on the *Collaborate to Improve Teaching* scale. Students with **Very Collaborative** teachers had a score on the scale of at least 11.4, which corresponds to their teachers having interactions with other teachers at least "one to three times per week" in each of three of the five areas and "two or three times per month" in each of the other two, on average. Students with **Somewhat Collaborative** teachers had a score no higher than 7.5, which corresponds to their teachers interacting with other teachers "never or almost never" in each of three of the five areas and "two or three times per month" in the other two, on average. All other students had **Collaborative** teachers.

Country	Very Collaborative		Collaborative		Somewhat Collaborative		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Israel	62 (3.0)	526 (5.8)	36 (3.0)	509 (7.5)	2 (0.7)	~ ~	11.4 (0.09)
Bahrain	51 (3.4)	410 (4.5)	42 (3.1)	413 (6.0)	8 (1.9)	392 (8.3)	11.0 (0.14)
Qatar	51 (4.4)	397 (8.9)	46 (4.4)	417 (8.1)	4 (0.9)	488 (18.5)	11.1 (0.12)
Kazakhstan	48 (3.8)	486 (5.7)	52 (3.8)	487 (5.7)	1 (0.5)	~ ~	11.2 (0.10)
Indonesia	45 (4.1)	381 (6.9)	50 (4.3)	391 (7.1)	5 (1.7)	370 (23.1)	10.7 (0.15)
Romania	43 (4.2)	466 (7.9)	55 (4.2)	452 (6.3)	2 (1.1)	~ ~	11.1 (0.13)
Slovenia	42 (2.7)	505 (3.7)	51 (2.8)	503 (2.7)	7 (1.8)	509 (9.0)	10.7 (0.11)
Armenia	42 (3.3)	467 (5.0)	57 (3.3)	466 (3.5)	1 (0.8)	~ ~	11.0 (0.11)
United States r	39 (2.7)	509 (5.7)	40 (2.9)	510 (4.5)	22 (2.1)	520 (6.4)	10.0 (0.15)
Oman	38 (3.5)	374 (5.1)	54 (3.5)	364 (5.0)	7 (1.7)	343 (10.3)	10.6 (0.11)
Macedonia, Rep. of r	38 (3.7)	424 (10.9)	53 (3.6)	421 (8.8)	9 (2.5)	441 (16.4)	10.5 (0.15)
United Arab Emirates	36 (2.7)	456 (4.6)	60 (2.5)	454 (3.4)	4 (1.1)	458 (10.2)	10.6 (0.09)
Lebanon	36 (4.1)	454 (6.2)	49 (3.8)	450 (5.5)	16 (3.4)	437 (10.0)	10.2 (0.18)
Georgia	34 (3.9)	434 (7.2)	64 (3.8)	431 (4.7)	2 (1.2)	~ ~	10.7 (0.14)
Ghana	33 (4.1)	328 (5.4)	54 (4.2)	326 (6.4)	12 (2.7)	357 (15.8)	10.4 (0.18)
Australia r	32 (3.9)	510 (10.0)	55 (4.0)	509 (8.1)	12 (2.1)	490 (8.8)	10.0 (0.15)
Ukraine	31 (4.2)	485 (6.8)	69 (4.2)	476 (5.3)	0 (0.0)	~ ~	10.6 (0.10)
Chile	29 (3.5)	419 (6.4)	43 (3.9)	420 (5.5)	28 (3.8)	408 (5.9)	9.4 (0.22)
Malaysia	28 (3.5)	431 (10.4)	64 (4.0)	448 (5.9)	7 (2.3)	411 (19.6)	10.2 (0.12)
Turkey	28 (3.0)	463 (10.2)	55 (3.4)	451 (5.3)	17 (2.4)	438 (8.7)	9.9 (0.14)
Thailand	26 (3.6)	427 (8.6)	58 (4.1)	424 (6.5)	16 (3.1)	441 (13.9)	10.0 (0.21)
Norway	26 (4.0)	479 (5.2)	56 (4.2)	475 (2.8)	18 (3.5)	470 (4.3)	9.8 (0.17)
Saudi Arabia	25 (2.7)	401 (9.1)	58 (3.2)	399 (6.4)	17 (2.6)	376 (9.0)	9.8 (0.14)
Jordan	24 (3.6)	406 (6.9)	61 (4.1)	412 (5.0)	14 (2.9)	380 (12.4)	9.9 (0.14)
England	24 (3.8)	502 (12.4)	57 (4.2)	505 (7.9)	20 (3.1)	512 (16.5)	9.7 (0.15)
Sweden r	23 (3.2)	491 (4.8)	54 (3.7)	485 (2.7)	23 (3.1)	480 (4.2)	9.4 (0.16)
Hungary	23 (3.0)	494 (9.1)	70 (3.0)	507 (4.0)	7 (1.7)	511 (13.0)	10.1 (0.12)
Palestinian Nat'l Auth.	22 (3.6)	400 (6.8)	69 (4.1)	403 (5.1)	9 (2.4)	421 (12.3)	10.1 (0.12)
New Zealand	22 (3.3)	461 (9.2)	62 (4.2)	497 (6.6)	16 (2.5)	477 (9.4)	9.6 (0.13)
Finland	19 (2.7)	509 (5.4)	63 (3.5)	515 (2.7)	17 (3.0)	517 (4.9)	9.7 (0.13)
Singapore	17 (1.7)	611 (9.4)	70 (2.3)	610 (4.8)	13 (1.8)	616 (10.9)	9.6 (0.08)
Russian Federation	17 (2.7)	543 (6.4)	79 (2.5)	540 (4.3)	4 (1.4)	515 (12.7)	10.2 (0.11)
Syrian Arab Republic	15 (2.9)	372 (11.0)	64 (4.0)	385 (5.4)	20 (3.4)	365 (10.3)	9.4 (0.16)
Japan	15 (2.7)	572 (9.1)	61 (3.8)	569 (4.0)	24 (3.4)	571 (5.0)	9.1 (0.18)
Korea, Rep. of	15 (2.3)	613 (7.5)	62 (2.9)	613 (3.7)	23 (2.6)	610 (6.8)	9.1 (0.12)
Italy	13 (2.7)	499 (10.5)	56 (3.8)	502 (3.9)	31 (3.6)	495 (4.4)	8.8 (0.18)
Chinese Taipei	13 (2.9)	610 (9.4)	56 (4.4)	614 (5.0)	31 (3.8)	601 (8.0)	9.0 (0.17)
Lithuania	13 (2.1)	495 (7.7)	70 (3.1)	505 (3.6)	17 (2.8)	495 (8.0)	9.5 (0.11)
Iran, Islamic Rep. of	12 (2.0)	422 (10.4)	65 (3.5)	415 (5.5)	24 (2.9)	411 (8.8)	9.2 (0.13)
Hong Kong SAR	11 (3.0)	584 (13.2)	71 (3.7)	581 (5.5)	18 (3.1)	608 (9.1)	9.2 (0.16)
Morocco	11 (2.0)	381 (6.9)	45 (3.0)	375 (3.2)	44 (2.7)	365 (3.6)	8.2 (0.13)
Tunisia	9 (2.2)	416 (6.3)	52 (3.9)	425 (4.0)	40 (4.0)	426 (5.1)	8.3 (0.15)
International Avg.	28 (0.5)	467 (1.2)	57 (0.6)	468 (0.8)	15 (0.4)	465 (1.9)	

Centerpoint of scale set at 10.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

TIMSS & PIRLS International Study Center
Lynch School of Education, Boston College

Exhibit 8.13: Collaborate to Improve Teaching (Continued)

Country		Very Collaborative		Collaborative		Somewhat Collaborative		Average Scale Score
		Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Ninth Grade Participants								
Botswana		48 (4.0)	394 (3.5)	44 (4.1)	396 (4.3)	8 (2.4)	413 (12.2)	10.9 (0.18)
South Africa		35 (3.0)	353 (5.5)	53 (3.6)	352 (5.2)	12 (2.0)	351 (7.1)	10.3 (0.12)
Honduras		23 (4.6)	334 (10.3)	50 (4.4)	347 (6.9)	26 (4.1)	321 (5.5)	9.4 (0.24)
Benchmarking Participants								
North Carolina, US	r	48 (6.8)	527 (9.6)	43 (6.6)	552 (12.9)	9 (4.2)	562 (10.7)	10.8 (0.30)
Dubai, UAE		40 (4.1)	473 (6.6)	55 (4.2)	478 (4.9)	6 (1.3)	475 (12.2)	10.8 (0.09)
Colorado, US	r	35 (7.8)	513 (9.4)	46 (7.3)	524 (12.8)	19 (5.3)	513 (17.8)	10.0 (0.34)
Ontario, Canada		33 (3.4)	516 (3.9)	49 (3.6)	511 (4.0)	18 (3.0)	511 (5.8)	10.1 (0.20)
Abu Dhabi, UAE		33 (4.5)	451 (7.6)	63 (4.3)	449 (6.6)	4 (1.6)	442 (20.5)	10.6 (0.16)
Connecticut, US		32 (6.6)	516 (16.0)	44 (6.6)	526 (9.4)	23 (6.2)	516 (17.1)	9.6 (0.37)
California, US	r	31 (5.2)	471 (11.2)	49 (7.5)	504 (10.3)	20 (5.6)	497 (12.7)	9.9 (0.27)
Alabama, US	r	31 (6.8)	478 (10.9)	46 (6.6)	461 (11.4)	23 (5.5)	467 (11.4)	9.6 (0.39)
Florida, US	r	31 (6.0)	532 (17.8)	50 (6.4)	502 (7.3)	19 (5.3)	542 (9.4)	9.9 (0.30)
Minnesota, US		27 (6.4)	529 (16.9)	50 (6.1)	555 (6.8)	23 (5.6)	543 (11.5)	9.5 (0.37)
Alberta, Canada		24 (3.9)	502 (6.0)	50 (4.3)	507 (3.6)	26 (3.4)	503 (3.9)	9.5 (0.19)
Indiana, US	r	23 (5.8)	510 (12.0)	57 (6.4)	518 (5.9)	21 (5.0)	530 (12.2)	9.6 (0.27)
Massachusetts, US		21 (5.7)	564 (18.0)	53 (7.2)	562 (8.6)	26 (6.6)	548 (13.6)	9.4 (0.31)
Quebec, Canada		11 (2.8)	536 (8.2)	66 (4.0)	530 (3.4)	23 (3.4)	538 (5.7)	9.2 (0.16)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

How often do you have the following types of interactions with other teachers?

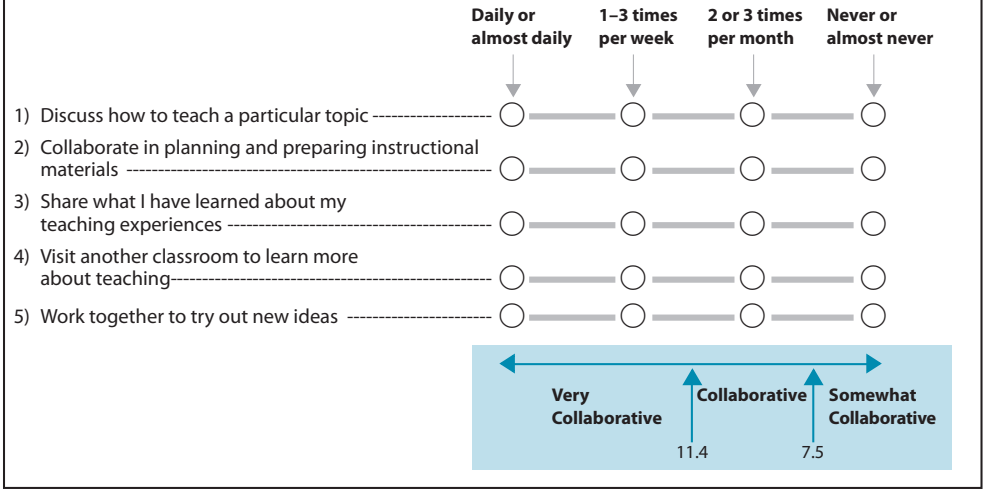


Exhibit 8.14: Instruction to Engage Students in Learning

TIMSS 2011 4th Grade Mathematics

Reported by Teachers

Students were scored according to their teachers' responses to how often they used each of six instructional practices on the *Engaging Students in Learning* scale. Students with teachers who used engagement practices in **Most Lessons** had a score on the scale of at least 9.1, which corresponds to their teachers using three of the six practices "every or almost every lesson" and using the other three in "about half the lessons," on average. Students with teachers who used engagement practices in **Some Lessons** had a score no higher than 6.0, which corresponds to their teachers using three of the six practices in "some lessons" and using the other three in "about half the lessons," on average. All other students had teachers who used engagement practices in **About Half the Lessons**.

Country	Most Lessons		About Half the Lessons		Some Lessons		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Romania	94 (1.8)	481 (6.3)	6 (1.5)	483 (14.4)	1 (0.0)	~ ~	11.4 (0.15)
Lithuania	93 (1.6)	534 (2.6)	7 (1.6)	532 (10.2)	0 (0.0)	~ ~	11.0 (0.11)
United States r	90 (1.3)	541 (2.2)	9 (1.2)	555 (6.8)	1 (0.5)	~ ~	10.9 (0.09)
Portugal	89 (2.1)	533 (3.9)	10 (2.1)	528 (7.9)	0 (0.0)	~ ~	10.8 (0.13)
Kazakhstan	89 (2.1)	503 (5.0)	11 (2.1)	494 (11.3)	0 (0.0)	~ ~	11.6 (0.14)
Hungary	87 (2.1)	515 (3.9)	12 (2.0)	508 (10.5)	0 (0.2)	~ ~	10.6 (0.11)
Croatia	87 (2.2)	491 (2.0)	12 (2.2)	484 (7.0)	0 (0.2)	~ ~	10.5 (0.10)
United Arab Emirates	87 (1.5)	437 (2.2)	13 (1.5)	416 (8.3)	0 (0.4)	~ ~	10.9 (0.08)
England	86 (3.1)	545 (3.9)	14 (3.1)	538 (11.8)	0 (0.0)	~ ~	10.3 (0.14)
Qatar	84 (3.7)	412 (4.1)	16 (3.7)	415 (16.8)	0 (0.0)	~ ~	11.0 (0.18)
Slovenia	84 (2.8)	512 (2.4)	16 (2.8)	519 (7.4)	0 (0.0)	~ ~	10.5 (0.13)
Chile	83 (3.5)	460 (2.9)	17 (3.5)	472 (9.1)	0 (0.0)	~ ~	11.0 (0.16)
Oman	82 (2.6)	391 (3.1)	17 (2.6)	364 (6.9)	1 (0.6)	~ ~	10.5 (0.10)
Russian Federation	82 (3.0)	542 (3.8)	17 (2.9)	540 (8.1)	1 (0.7)	~ ~	10.7 (0.16)
Slovak Republic	82 (2.7)	506 (4.3)	17 (2.7)	511 (6.0)	0 (0.3)	~ ~	10.5 (0.12)
Northern Ireland r	80 (3.5)	560 (3.9)	18 (3.5)	576 (7.4)	2 (1.3)	~ ~	9.8 (0.14)
Malta	79 (0.1)	495 (1.3)	20 (0.1)	499 (3.4)	0 (0.0)	~ ~	10.2 (0.00)
Serbia	78 (3.4)	517 (3.5)	22 (3.4)	512 (6.0)	0 (0.4)	~ ~	10.3 (0.12)
Australia r	77 (3.5)	522 (4.0)	23 (3.5)	510 (6.1)	0 (0.2)	~ ~	10.0 (0.13)
Italy	76 (3.0)	509 (3.1)	22 (2.9)	507 (5.3)	2 (0.9)	~ ~	10.4 (0.14)
Georgia	76 (2.6)	453 (4.0)	23 (2.6)	444 (10.3)	1 (0.4)	~ ~	10.5 (0.13)
Iran, Islamic Rep. of	75 (2.7)	434 (4.7)	24 (2.8)	420 (6.8)	1 (0.4)	~ ~	10.3 (0.13)
Poland	74 (3.1)	480 (2.4)	25 (3.1)	485 (4.6)	1 (0.6)	~ ~	10.2 (0.12)
Czech Republic	73 (3.5)	513 (2.5)	27 (3.5)	504 (6.3)	1 (0.8)	~ ~	9.7 (0.11)
Bahrain	71 (5.4)	439 (5.0)	28 (5.4)	430 (5.7)	1 (0.6)	~ ~	10.1 (0.20)
Thailand	69 (3.5)	463 (5.3)	29 (3.5)	450 (9.0)	2 (1.0)	~ ~	10.0 (0.17)
Armenia	69 (3.7)	453 (3.8)	31 (3.7)	451 (7.8)	1 (0.5)	~ ~	10.1 (0.16)
Azerbaijan	69 (3.3)	466 (6.4)	31 (3.3)	458 (10.8)	0 (0.0)	~ ~	10.0 (0.14)
Ireland	68 (3.1)	524 (3.0)	31 (3.1)	534 (5.7)	1 (0.5)	~ ~	9.8 (0.12)
New Zealand	67 (3.0)	486 (3.6)	33 (3.0)	487 (4.9)	0 (0.1)	~ ~	9.7 (0.10)
Tunisia	67 (4.3)	360 (4.9)	31 (4.1)	361 (6.1)	2 (1.1)	~ ~	9.9 (0.18)
Morocco	66 (3.5)	343 (5.7)	33 (3.4)	328 (5.3)	1 (0.4)	~ ~	10.0 (0.19)
Saudi Arabia	66 (3.6)	418 (7.0)	33 (3.6)	395 (7.6)	1 (0.6)	~ ~	10.0 (0.15)
Spain	66 (3.5)	483 (3.4)	33 (3.5)	483 (5.6)	2 (1.1)	~ ~	9.9 (0.16)
Korea, Rep. of	65 (4.2)	607 (2.6)	34 (4.2)	601 (3.4)	1 (0.9)	~ ~	10.2 (0.19)
Turkey	64 (3.5)	480 (5.9)	34 (3.4)	449 (8.7)	2 (0.9)	~ ~	9.9 (0.13)
Singapore	60 (2.7)	606 (4.7)	36 (2.7)	603 (5.7)	4 (1.1)	626 (14.2)	9.3 (0.10)
Kuwait	57 (3.4)	343 (4.9)	41 (3.6)	341 (5.3)	2 (1.0)	~ ~	9.6 (0.14)
Belgium (Flemish)	56 (3.2)	551 (2.4)	43 (3.3)	547 (2.8)	1 (0.5)	~ ~	9.1 (0.10)
Hong Kong SAR	52 (4.3)	609 (4.1)	44 (4.2)	598 (4.6)	4 (1.8)	555 (51.1)	9.1 (0.18)
Japan	52 (4.0)	586 (2.0)	46 (4.0)	584 (2.8)	2 (1.0)	~ ~	9.0 (0.13)
Austria	51 (3.5)	505 (2.9)	46 (3.3)	512 (4.4)	3 (1.1)	497 (15.6)	9.0 (0.12)
Sweden r	49 (4.2)	508 (3.3)	49 (4.4)	503 (3.6)	2 (1.1)	~ ~	8.8 (0.14)
Germany	47 (3.1)	527 (3.3)	48 (3.0)	527 (2.7)	5 (1.6)	544 (6.4)	8.7 (0.10)
Netherlands r	41 (3.9)	536 (3.4)	55 (4.2)	540 (3.0)	4 (2.0)	546 (17.6)	8.5 (0.11)
Norway	41 (4.6)	500 (5.1)	55 (4.7)	490 (3.5)	4 (1.9)	506 (11.7)	8.6 (0.13)
Chinese Taipei	39 (4.3)	588 (3.4)	46 (3.8)	596 (3.2)	15 (3.1)	588 (5.9)	8.5 (0.21)
Finland	34 (3.1)	551 (3.0)	60 (3.2)	543 (3.4)	6 (1.4)	549 (5.8)	8.3 (0.10)
Yemen	31 (4.0)	269 (12.2)	62 (4.4)	234 (6.7)	7 (2.3)	268 (17.4)	8.4 (0.14)
Denmark	24 (3.2)	536 (5.8)	65 (3.6)	542 (2.7)	12 (2.6)	532 (9.3)	7.8 (0.12)
International Avg.	69 (0.5)	492 (0.6)	30 (0.5)	488 (1.0)	2 (0.1)	~ ~	

Centerpoint of scale set at 10.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

TIMSS & PIRLS International Study Center
Lynch School of Education, Boston College

Exhibit 8.14: Instruction to Engage Students in Learning (Continued)

Country		Most Lessons		About Half the Lessons		Some Lessons		Average Scale Score
		Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Sixth Grade Participants								
Honduras		79 (4.1)	403 (5.7)	20 (4.1)	370 (14.5)	1 (1.0)	~ ~	10.3 (0.18)
Botswana		73 (4.1)	419 (5.0)	26 (4.1)	425 (8.8)	2 (1.1)	~ ~	10.2 (0.18)
Yemen		31 (4.2)	358 (9.6)	61 (4.6)	342 (7.2)	9 (2.7)	350 (15.6)	8.3 (0.15)
Benchmarking Participants								
Florida, US	r	95 (1.9)	544 (3.8)	5 (1.9)	556 (29.0)	0 (0.0)	~ ~	11.1 (0.16)
Dubai, UAE	r	92 (1.6)	476 (2.7)	8 (1.6)	418 (15.1)	0 (0.0)	~ ~	11.2 (0.11)
Abu Dhabi, UAE		90 (2.5)	418 (4.9)	10 (2.5)	419 (23.1)	0 (0.0)	~ ~	11.1 (0.14)
North Carolina, US		90 (3.0)	553 (4.8)	9 (2.7)	561 (11.2)	1 (1.3)	~ ~	10.8 (0.16)
Alberta, Canada	r	82 (3.9)	507 (2.8)	18 (3.9)	504 (8.2)	0 (0.0)	~ ~	10.2 (0.13)
Ontario, Canada		79 (3.2)	520 (3.2)	21 (3.2)	515 (6.4)	0 (0.0)	~ ~	10.0 (0.13)
Quebec, Canada		60 (4.0)	533 (3.5)	39 (4.1)	532 (3.4)	1 (0.6)	~ ~	9.4 (0.12)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

How often do you do the following in teaching this class?

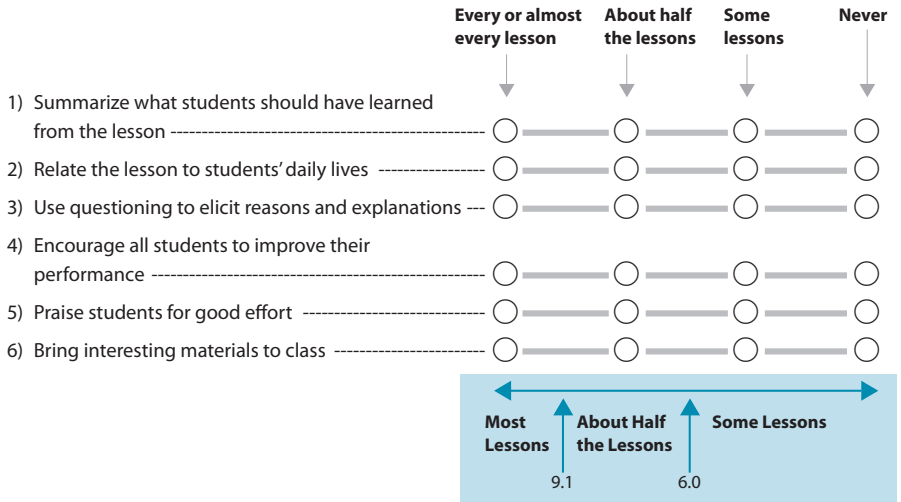


Exhibit 8.15: Instruction to Engage Students in Learning

TIMSS 2011 8th Grade Mathematics

Reported by Teachers

Students were scored according to their teachers' responses to how often they used each of four instructional practices on the *Engaging Students in Learning* scale. Students with teachers who used engagement practices in **Most Lessons** had a score on the scale of at least 8.7, which corresponds to their teachers using two of the four practices "every or almost every lesson" and using the other two in "about half the lessons," on average. Students with teachers who used engagement practices in **Some Lessons** had a score no higher than 5.7, which corresponds to their teachers using two of the four practices in "some lessons" and using the other two in "about half the lessons," on average. All other students had teachers who used engagement practices in **About Half the Lessons**.

Country	Most Lessons		About Half the Lessons		Some Lessons		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Lithuania	93 (1.6)	502 (2.7)	6 (1.5)	501 (10.4)	1 (0.6)	~ ~	10.5 (0.11)
United States r	93 (1.2)	511 (3.2)	7 (1.1)	526 (16.6)	0 (0.2)	~ ~	10.8 (0.07)
Indonesia	93 (3.1)	389 (4.1)	5 (1.7)	383 (18.7)	3 (2.7)	282 (13.1)	10.7 (0.25)
United Arab Emirates	93 (1.1)	456 (2.2)	7 (1.0)	449 (10.7)	1 (0.4)	~ ~	10.9 (0.08)
England	92 (1.8)	508 (5.9)	6 (1.9)	512 (31.3)	2 (1.6)	~ ~	10.6 (0.16)
Romania	91 (2.6)	461 (4.2)	8 (2.4)	430 (10.2)	1 (0.8)	~ ~	10.9 (0.14)
Ghana	91 (2.5)	330 (4.6)	9 (2.5)	341 (14.1)	0 (0.0)	~ ~	10.7 (0.13)
Ukraine	91 (2.7)	480 (4.2)	9 (2.7)	468 (10.9)	0 (0.0)	~ ~	10.6 (0.15)
Bahrain	90 (1.7)	413 (2.1)	9 (1.9)	378 (7.5)	1 (0.8)	~ ~	10.3 (0.11)
Kazakhstan	90 (2.6)	493 (4.2)	9 (2.5)	440 (14.6)	1 (0.9)	~ ~	10.8 (0.15)
Palestinian Nat'l Auth.	90 (2.4)	405 (3.9)	10 (2.3)	397 (9.8)	1 (0.6)	~ ~	10.5 (0.13)
Qatar	89 (2.7)	417 (4.0)	11 (2.7)	363 (16.6)	0 (0.0)	~ ~	10.9 (0.13)
Slovenia	89 (1.4)	505 (2.3)	10 (1.3)	508 (6.4)	1 (0.3)	~ ~	10.3 (0.08)
Syrian Arab Republic	88 (3.2)	379 (4.9)	11 (3.1)	376 (14.6)	1 (0.8)	~ ~	10.2 (0.16)
Chile	88 (2.4)	414 (3.0)	11 (2.3)	441 (12.2)	1 (0.8)	~ ~	10.5 (0.13)
Saudi Arabia	87 (2.8)	397 (4.5)	12 (2.8)	381 (14.2)	1 (0.0)	~ ~	10.4 (0.16)
Jordan	86 (2.4)	409 (4.0)	13 (2.3)	385 (11.4)	1 (0.7)	~ ~	10.3 (0.13)
Morocco	86 (2.4)	374 (2.2)	14 (2.4)	355 (4.5)	0 (0.4)	~ ~	10.4 (0.13)
Lebanon	86 (3.2)	452 (4.1)	12 (3.0)	437 (9.7)	3 (1.3)	433 (8.5)	10.4 (0.15)
Turkey	86 (2.3)	455 (4.3)	12 (2.1)	444 (12.1)	3 (1.1)	403 (19.4)	10.0 (0.12)
Macedonia, Rep. of r	85 (2.8)	432 (6.8)	11 (2.1)	388 (11.4)	4 (1.6)	396 (16.3)	10.5 (0.17)
Israel	84 (2.0)	519 (4.7)	14 (2.1)	516 (12.1)	2 (0.9)	~ ~	10.2 (0.12)
Tunisia	84 (2.6)	427 (3.3)	14 (2.3)	412 (5.7)	2 (1.3)	~ ~	10.3 (0.15)
Georgia	83 (3.0)	433 (4.5)	15 (2.8)	420 (9.1)	2 (1.2)	~ ~	10.3 (0.15)
Iran, Islamic Rep. of	82 (2.3)	416 (4.9)	16 (2.3)	417 (11.7)	2 (1.0)	~ ~	10.1 (0.11)
Oman	82 (2.2)	373 (3.1)	17 (2.2)	334 (8.3)	1 (0.5)	~ ~	10.1 (0.10)
Russian Federation	79 (3.1)	541 (4.1)	19 (2.9)	539 (7.5)	2 (0.8)	~ ~	9.9 (0.13)
New Zealand	79 (3.0)	487 (5.2)	20 (2.8)	492 (14.4)	2 (1.1)	~ ~	9.7 (0.12)
Italy	79 (3.2)	498 (3.2)	20 (3.1)	503 (6.0)	1 (0.9)	~ ~	9.8 (0.15)
Hungary	76 (2.8)	505 (3.9)	20 (2.5)	505 (7.6)	4 (1.8)	481 (20.9)	9.7 (0.14)
Australia r	75 (4.0)	508 (6.7)	22 (3.7)	505 (10.0)	3 (1.4)	533 (34.8)	9.5 (0.16)
Malaysia	73 (3.6)	448 (5.8)	22 (3.2)	421 (12.3)	5 (1.6)	417 (25.1)	9.5 (0.16)
Thailand	71 (3.4)	428 (5.2)	24 (3.3)	426 (10.8)	4 (1.6)	419 (18.2)	9.6 (0.15)
Armenia	71 (3.3)	470 (3.6)	25 (3.2)	457 (7.4)	4 (1.4)	458 (15.6)	9.7 (0.14)
Korea, Rep. of	65 (3.0)	616 (4.1)	28 (2.6)	609 (5.8)	7 (1.6)	598 (11.7)	9.3 (0.14)
Sweden r	65 (3.1)	486 (2.5)	31 (3.1)	488 (4.4)	4 (1.3)	479 (6.3)	8.9 (0.12)
Singapore	63 (2.5)	615 (4.4)	27 (2.3)	609 (6.4)	10 (1.5)	594 (16.1)	9.0 (0.11)
Japan	55 (4.3)	571 (4.7)	38 (4.2)	567 (4.2)	6 (2.1)	573 (11.0)	8.8 (0.20)
Hong Kong SAR	52 (4.2)	586 (5.5)	42 (4.4)	592 (6.8)	6 (2.0)	552 (37.3)	8.7 (0.18)
Norway	51 (3.7)	472 (3.8)	40 (4.0)	477 (3.3)	9 (2.2)	485 (5.4)	8.5 (0.15)
Finland	51 (3.2)	517 (2.9)	41 (3.1)	511 (3.9)	8 (1.8)	518 (5.6)	8.5 (0.11)
Chinese Taipei	46 (4.2)	621 (5.5)	35 (3.6)	593 (6.0)	19 (3.2)	612 (8.7)	8.4 (0.22)
International Avg.	80 (0.4)	469 (0.7)	17 (0.4)	459 (1.8)	3 (0.2)	484 (4.5)	

Centerpoint of scale set at 10.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 8.15: Instruction to Engage Students in Learning (Continued)

TIMSS 2011 Mathematics 8th Grade

Country		Most Lessons		About Half the Lessons		Some Lessons		Average Scale Score
		Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Ninth Grade Participants								
Honduras	r	85 (3.4)	338 (5.2)	13 (3.0)	335 (9.0)	2 (1.7)	~ ~	10.3 (0.18)
Botswana		85 (3.0)	396 (2.8)	13 (2.9)	394 (7.9)	3 (1.3)	390 (14.4)	9.9 (0.15)
South Africa		77 (3.5)	353 (3.6)	19 (3.2)	350 (9.7)	4 (1.4)	347 (9.2)	9.9 (0.18)
Benchmarking Participants								
California, US	s	97 (1.8)	491 (6.5)	3 (1.8)	505 (49.1)	0 (0.0)	~ ~	10.8 (0.20)
Connecticut, US	r	95 (2.7)	524 (5.5)	3 (2.1)	562 (9.3)	2 (1.7)	~ ~	10.9 (0.14)
Abu Dhabi, UAE		95 (1.9)	447 (3.9)	5 (1.9)	505 (17.4)	0 (0.0)	~ ~	10.9 (0.12)
Alabama, US	r	94 (2.9)	467 (8.7)	4 (2.2)	454 (36.0)	2 (1.9)	~ ~	11.0 (0.23)
North Carolina, US	r	94 (3.2)	537 (6.9)	6 (3.2)	557 (52.4)	0 (0.0)	~ ~	11.2 (0.17)
Massachusetts, US	r	93 (3.0)	558 (6.3)	7 (3.0)	596 (12.6)	1 (0.8)	~ ~	10.7 (0.17)
Florida, US	r	92 (4.1)	523 (6.9)	8 (4.1)	458 (23.0)	0 (0.0)	~ ~	10.9 (0.19)
Dubai, UAE		91 (1.2)	482 (2.7)	9 (1.2)	423 (13.1)	0 (0.0)	~ ~	11.0 (0.07)
Colorado, US	r	87 (4.3)	519 (6.5)	11 (4.1)	504 (17.4)	1 (0.1)	~ ~	10.6 (0.19)
Alberta, Canada		87 (2.6)	505 (3.1)	12 (2.5)	504 (6.0)	1 (0.9)	~ ~	10.4 (0.14)
Indiana, US	r	84 (4.4)	513 (5.6)	15 (4.9)	533 (9.7)	1 (1.1)	~ ~	10.6 (0.23)
Minnesota, US	r	83 (5.1)	549 (7.3)	17 (5.1)	540 (14.8)	0 (0.0)	~ ~	10.1 (0.25)
Ontario, Canada		82 (3.0)	514 (2.8)	16 (2.9)	507 (5.4)	2 (1.0)	~ ~	10.1 (0.13)
Quebec, Canada		64 (3.7)	528 (3.0)	31 (3.4)	540 (4.8)	4 (2.0)	567 (11.8)	9.1 (0.16)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

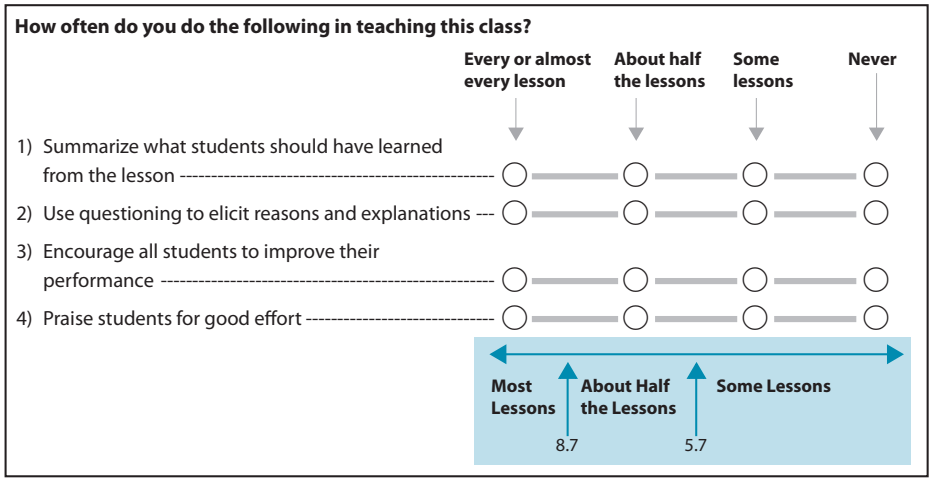


Exhibit 8.16: Teachers Relate Lessons to Students' Daily Lives and Bring Interesting Materials to Class

TIMSS 2011 8th Grade Mathematics

Reported by Teachers

Country	Relate Lessons to Students' Daily Lives					Bring Interesting Materials to Class				
	Every Lesson or Almost Every Lesson		About Half the Lessons or Less			Every Lesson or Almost Every Lesson		About Half the Lessons or Less		
	Percent of Students	Average Achievement	Percent of Students	Average Achievement		Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Armenia	45 (3.7)	471 (4.9)	55 (3.7)	462 (4.8)		10 (2.4)	483 (13.2)	90 (2.4)	463 (2.8)	
Australia	r 25 (3.4)	512 (12.2)	75 (3.4)	507 (5.8)		r 8 (2.3)	523 (17.3)	92 (2.3)	507 (5.8)	
Bahrain	53 (3.6)	406 (5.6)	47 (3.6)	414 (5.1)		12 (2.1)	404 (10.5)	88 (2.1)	410 (2.8)	
Chile	70 (3.3)	406 (3.8)	30 (3.3)	442 (5.0)		25 (3.7)	399 (6.8)	75 (3.7)	423 (3.7)	
Chinese Taipei	21 (3.6)	614 (8.3)	79 (3.6)	608 (3.7)		6 (1.7)	618 (25.0)	94 (1.7)	609 (3.1)	
England	15 (2.9)	504 (15.0)	85 (2.9)	506 (6.1)		7 (1.7)	480 (21.0)	93 (1.7)	508 (5.8)	
Finland	18 (3.0)	504 (6.2)	82 (3.0)	517 (2.4)		4 (1.6)	515 (8.2)	96 (1.6)	514 (2.6)	
Georgia	38 (3.5)	438 (8.2)	62 (3.5)	427 (4.7)		30 (3.4)	444 (9.9)	70 (3.4)	426 (4.2)	
Ghana	65 (3.9)	330 (5.7)	35 (3.9)	332 (7.9)		33 (3.8)	333 (7.3)	67 (3.8)	330 (5.4)	
Hong Kong SAR	9 (2.7)	571 (17.6)	91 (2.7)	588 (4.3)		10 (2.4)	570 (15.8)	90 (2.4)	588 (4.2)	
Hungary	45 (3.6)	504 (5.6)	55 (3.6)	505 (5.5)		14 (2.2)	517 (10.8)	86 (2.2)	502 (3.8)	
Indonesia	78 (4.0)	389 (4.5)	22 (4.0)	374 (12.3)		39 (4.1)	396 (6.2)	61 (4.1)	379 (6.0)	
Iran, Islamic Rep. of	29 (3.1)	427 (8.0)	71 (3.1)	410 (5.1)		17 (2.9)	426 (8.2)	83 (2.9)	413 (4.9)	
Israel	35 (3.0)	514 (7.0)	65 (3.0)	521 (5.6)		29 (3.2)	533 (9.7)	71 (3.2)	513 (5.0)	
Italy	41 (3.8)	502 (4.0)	59 (3.8)	497 (3.9)		14 (2.8)	502 (5.3)	86 (2.8)	499 (3.0)	
Japan	10 (2.3)	575 (7.1)	90 (2.3)	569 (3.0)		5 (1.7)	576 (11.9)	95 (1.7)	569 (2.8)	
Jordan	60 (3.8)	401 (5.8)	40 (3.8)	413 (5.7)		15 (2.5)	412 (10.0)	85 (2.5)	405 (4.6)	
Kazakhstan	53 (4.1)	489 (5.5)	47 (4.1)	486 (6.5)		49 (3.8)	488 (6.7)	51 (3.8)	487 (5.8)	
Korea, Rep. of	21 (2.5)	617 (6.1)	79 (2.5)	611 (3.2)		15 (2.5)	617 (7.7)	85 (2.5)	612 (3.0)	
Lebanon	33 (4.0)	443 (6.3)	67 (4.0)	453 (4.4)		16 (3.0)	437 (8.5)	84 (3.0)	453 (4.2)	
Lithuania	30 (3.3)	499 (6.0)	70 (3.3)	504 (3.0)		16 (2.8)	493 (10.2)	84 (2.8)	504 (2.7)	
Macedonia, Rep. of	r 60 (4.5)	422 (6.9)	40 (4.5)	428 (10.7)		r 38 (4.5)	432 (10.2)	62 (4.5)	421 (7.7)	
Malaysia	39 (3.9)	441 (9.6)	61 (3.9)	440 (7.0)		13 (2.4)	416 (19.2)	87 (2.4)	444 (5.2)	
Morocco	32 (3.1)	376 (4.6)	68 (3.1)	369 (3.1)		13 (2.0)	387 (6.6)	87 (2.0)	369 (2.4)	
New Zealand	21 (2.3)	469 (13.1)	79 (2.3)	494 (5.8)		7 (1.9)	487 (18.3)	93 (1.9)	489 (5.9)	
Norway	21 (3.0)	472 (5.8)	79 (3.0)	476 (2.6)		9 (2.5)	469 (7.7)	91 (2.5)	476 (2.5)	
Oman	36 (3.3)	373 (5.7)	64 (3.3)	362 (4.3)		12 (2.2)	384 (12.4)	88 (2.2)	363 (3.3)	
Palestinian Nat'l Auth.	50 (4.4)	406 (5.3)	50 (4.4)	402 (5.4)		21 (3.5)	408 (8.2)	79 (3.5)	403 (4.2)	
Qatar	49 (3.2)	410 (5.8)	51 (3.2)	411 (6.5)		38 (4.3)	409 (9.2)	62 (4.3)	412 (6.2)	
Romania	63 (4.1)	464 (5.6)	37 (4.1)	448 (6.8)		34 (3.6)	471 (8.1)	66 (3.6)	451 (5.5)	
Russian Federation	26 (3.4)	547 (6.7)	74 (3.4)	536 (4.2)		19 (2.7)	545 (10.3)	81 (2.7)	538 (3.5)	
Saudi Arabia	58 (4.3)	397 (5.4)	42 (4.3)	392 (7.1)		20 (3.2)	398 (7.8)	80 (3.2)	394 (5.1)	
Singapore	16 (1.7)	605 (10.2)	84 (1.7)	613 (4.2)		4 (1.1)	601 (13.6)	96 (1.1)	612 (3.8)	
Slovenia	46 (2.7)	504 (3.3)	54 (2.7)	506 (2.7)		8 (1.4)	499 (8.7)	92 (1.4)	506 (2.0)	
Sweden	r 18 (2.5)	491 (6.0)	82 (2.5)	485 (2.4)		r 10 (2.3)	495 (5.8)	90 (2.3)	485 (2.2)	
Syrian Arab Republic	53 (4.2)	373 (6.6)	47 (4.2)	385 (5.7)		19 (3.6)	383 (9.6)	81 (3.6)	378 (4.9)	
Thailand	42 (4.2)	437 (7.7)	58 (4.2)	419 (6.3)		19 (3.1)	446 (13.4)	81 (3.1)	423 (4.9)	
Tunisia	20 (2.7)	413 (6.6)	80 (2.7)	428 (3.7)		7 (2.0)	411 (10.1)	93 (2.0)	426 (3.1)	
Turkey	51 (3.5)	450 (6.6)	49 (3.5)	455 (5.1)		19 (2.5)	460 (12.0)	81 (2.5)	451 (4.3)	
Ukraine	33 (3.9)	499 (7.1)	67 (3.9)	469 (4.7)		21 (3.1)	476 (7.1)	79 (3.1)	480 (4.7)	
United Arab Emirates	58 (2.5)	451 (3.7)	42 (2.5)	460 (3.7)		27 (1.9)	453 (5.9)	73 (1.9)	456 (2.5)	
United States	r 40 (2.4)	499 (4.4)	60 (2.4)	520 (4.1)		r 18 (2.4)	511 (8.3)	82 (2.4)	512 (3.6)	
International Avg.	39 (0.5)	467 (1.2)	61 (0.5)	468 (0.8)		18 (0.4)	469 (1.8)	82 (0.4)	467 (0.7)	

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 8.16: Teachers Relate Lessons to Students' Daily Lives and Bring Interesting Materials to Class (Continued)

Country	Relate Lessons to Students' Daily Lives				Bring Interesting Materials to Class			
	Every Lesson or Almost Every Lesson		About Half the Lessons or Less		Every Lesson or Almost Every Lesson		About Half the Lessons or Less	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Ninth Grade Participants								
Botswana	72 (4.1)	396 (3.3)	28 (4.1)	395 (5.7)	13 (3.0)	408 (7.7)	87 (3.0)	394 (2.6)
Honduras r	67 (4.2)	337 (6.0)	33 (4.2)	337 (7.1)	r 18 (3.6)	330 (8.8)	82 (3.6)	338 (5.2)
South Africa	49 (4.0)	337 (4.1)	51 (4.0)	367 (5.6)	23 (3.4)	320 (5.9)	77 (3.4)	361 (3.5)
Benchmarking Participants								
Alberta, Canada	41 (3.6)	507 (4.6)	59 (3.6)	503 (3.5)	12 (2.5)	499 (8.1)	88 (2.5)	506 (2.8)
Ontario, Canada	52 (3.9)	510 (3.4)	48 (3.9)	517 (3.9)	16 (2.7)	512 (5.0)	84 (2.7)	514 (3.0)
Quebec, Canada	23 (3.3)	535 (5.9)	77 (3.3)	532 (2.7)	14 (2.7)	527 (8.6)	86 (2.7)	534 (2.7)
Abu Dhabi, UAE	61 (4.3)	446 (5.9)	39 (4.3)	456 (6.1)	25 (3.4)	445 (11.7)	75 (3.4)	451 (4.2)
Dubai, UAE	51 (4.7)	471 (5.4)	49 (4.7)	482 (5.8)	33 (3.3)	477 (6.1)	67 (3.3)	476 (3.9)
Alabama, US r	40 (5.7)	468 (11.0)	60 (5.7)	466 (10.8)	r 12 (4.2)	443 (11.2)	88 (4.2)	470 (9.5)
California, US s	33 (6.6)	481 (10.7)	67 (6.6)	497 (8.4)	s 19 (5.5)	461 (11.2)	81 (5.5)	499 (6.6)
Colorado, US r	33 (6.6)	527 (15.0)	67 (6.6)	512 (8.1)	r 18 (4.0)	546 (8.9)	82 (4.0)	510 (6.5)
Connecticut, US r	36 (4.8)	520 (9.8)	64 (4.8)	527 (7.5)	r 14 (4.0)	512 (22.8)	86 (4.0)	526 (6.0)
Florida, US r	41 (6.1)	513 (13.0)	59 (6.1)	521 (9.4)	r 12 (3.5)	547 (21.4)	88 (3.5)	514 (8.4)
Indiana, US r	26 (6.3)	503 (11.7)	74 (6.3)	522 (5.1)	r 15 (5.2)	507 (12.8)	85 (5.2)	519 (5.9)
Massachusetts, US r	27 (6.6)	533 (12.0)	73 (6.6)	571 (7.9)	r 13 (4.8)	532 (18.1)	87 (4.8)	565 (6.7)
Minnesota, US r	27 (5.3)	551 (12.4)	73 (5.3)	545 (6.7)	r 17 (4.8)	555 (20.4)	83 (4.8)	545 (6.0)
North Carolina, US r	45 (6.3)	549 (10.7)	55 (6.3)	530 (9.8)	r 17 (5.6)	518 (15.7)	83 (5.6)	543 (8.0)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 8.17: Students Engaged in Mathematics Lessons

TIMSS 2011 Mathematics 4th Grade

Reported by Students

Students were scored according to their degree of agreement with five statements on the *Engaged in Mathematics Lessons* scale. Students **Engaged** in mathematics lessons had a score on the scale of at least 10.2, which corresponds to their "agreeing a lot" with three of the five statements and "agreeing a little" with the other two, on average. Students who were **Not Engaged** had a score no higher than 7.4, which corresponds to their "disagreeing a little" with three of the five statements and "agreeing a little" with the other two, on average. All other students were **Somewhat Engaged** in mathematics lessons.

Country	Engaged		Somewhat Engaged		Not Engaged		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Tunisia	65 (1.5)	376 (4.1)	32 (1.5)	339 (4.9)	3 (0.3)	295 (9.5)	11.2 (0.07)
Iran, Islamic Rep. of	59 (1.2)	442 (3.5)	36 (1.0)	418 (4.6)	4 (0.4)	390 (9.4)	10.8 (0.05)
Romania	59 (1.6)	507 (5.4)	36 (1.4)	454 (7.5)	5 (0.7)	422 (16.6)	10.8 (0.07)
Malta	57 (0.7)	512 (1.4)	37 (0.7)	478 (2.5)	6 (0.4)	460 (6.4)	10.7 (0.03)
Armenia	56 (1.3)	471 (4.0)	36 (1.0)	438 (4.1)	8 (0.7)	399 (5.3)	10.8 (0.06)
Russian Federation	56 (1.0)	551 (3.9)	40 (0.9)	533 (4.4)	5 (0.4)	523 (5.7)	10.6 (0.05)
Poland	52 (0.9)	493 (2.4)	43 (0.9)	473 (2.7)	5 (0.3)	454 (5.9)	10.4 (0.03)
Portugal	52 (1.6)	544 (4.1)	46 (1.5)	521 (3.5)	3 (0.4)	508 (8.6)	10.4 (0.07)
Hungary	52 (1.0)	538 (3.5)	43 (0.8)	494 (4.1)	6 (0.5)	491 (9.0)	10.4 (0.04)
Kazakhstan	51 (1.8)	518 (4.4)	46 (1.7)	489 (5.2)	3 (0.3)	443 (10.5)	10.6 (0.07)
Bahrain	49 (1.2)	457 (2.9)	44 (1.2)	426 (3.7)	6 (0.6)	407 (8.2)	10.4 (0.06)
Turkey	49 (1.2)	505 (3.4)	47 (1.0)	445 (4.7)	4 (0.4)	380 (7.0)	10.4 (0.05)
Oman	49 (1.0)	414 (2.9)	46 (0.9)	367 (3.4)	6 (0.4)	316 (6.6)	10.4 (0.04)
Serbia	49 (1.5)	527 (3.3)	45 (1.1)	508 (3.9)	6 (0.7)	498 (7.3)	10.3 (0.07)
Slovenia	48 (1.3)	520 (2.2)	47 (1.1)	509 (2.9)	5 (0.4)	484 (8.4)	10.2 (0.05)
Thailand	48 (1.7)	470 (4.9)	47 (1.5)	451 (5.2)	5 (0.6)	415 (11.1)	10.2 (0.07)
Lithuania	48 (1.1)	544 (2.5)	48 (1.1)	526 (3.2)	4 (0.4)	515 (5.9)	10.2 (0.04)
United Arab Emirates	48 (0.9)	457 (2.4)	46 (0.8)	419 (2.7)	6 (0.3)	395 (6.8)	10.4 (0.04)
Czech Republic	48 (1.4)	518 (3.0)	45 (1.1)	505 (2.5)	7 (0.7)	510 (6.2)	10.2 (0.06)
Saudi Arabia	47 (1.5)	431 (4.8)	47 (1.3)	396 (6.9)	6 (0.6)	373 (11.5)	10.4 (0.07)
Kuwait	46 (1.5)	369 (3.6)	46 (1.3)	330 (4.1)	9 (0.6)	318 (8.8)	10.3 (0.06)
United States	46 (0.8)	555 (2.0)	47 (0.7)	533 (2.1)	7 (0.3)	521 (3.4)	10.1 (0.03)
Spain	45 (1.4)	499 (2.6)	47 (1.2)	472 (3.5)	7 (0.8)	468 (5.7)	10.1 (0.07)
Morocco	45 (1.6)	363 (5.1)	47 (1.3)	319 (4.0)	8 (1.0)	293 (8.3)	10.2 (0.08)
Ireland	45 (1.3)	538 (3.6)	47 (1.1)	522 (3.3)	8 (0.6)	516 (5.0)	10.0 (0.06)
Georgia	44 (1.0)	474 (3.8)	53 (1.0)	443 (3.8)	3 (0.3)	409 (10.5)	10.4 (0.04)
Azerbaijan r	43 (1.8)	495 (7.6)	54 (1.7)	461 (4.9)	3 (0.4)	410 (11.9)	10.3 (0.07)
Norway	43 (1.6)	504 (3.2)	49 (1.3)	492 (3.2)	8 (0.8)	479 (7.6)	9.9 (0.07)
Germany	42 (1.0)	537 (3.0)	50 (1.0)	527 (2.8)	7 (0.5)	520 (4.6)	9.9 (0.04)
Australia	41 (1.2)	534 (3.1)	50 (1.1)	506 (3.8)	9 (0.5)	503 (5.3)	9.9 (0.05)
England	41 (1.6)	548 (4.8)	51 (1.4)	540 (3.7)	8 (0.6)	538 (7.7)	9.8 (0.06)
Slovak Republic	40 (1.2)	521 (4.4)	54 (1.1)	500 (3.5)	7 (0.5)	485 (7.8)	9.9 (0.05)
Italy	40 (1.2)	520 (3.1)	54 (1.1)	502 (2.9)	6 (0.5)	489 (5.7)	9.8 (0.04)
Northern Ireland	39 (1.3)	574 (4.1)	53 (1.1)	558 (3.7)	8 (0.7)	545 (8.2)	9.8 (0.05)
Austria	39 (1.1)	514 (3.2)	50 (1.0)	506 (3.0)	10 (0.8)	505 (3.7)	9.8 (0.05)
Chile	39 (1.1)	483 (3.1)	54 (0.9)	452 (2.4)	7 (0.5)	437 (5.4)	9.9 (0.04)
Qatar	39 (1.1)	454 (4.6)	52 (1.0)	399 (4.0)	9 (0.6)	379 (8.7)	10.0 (0.05)
Croatia	38 (1.1)	497 (2.4)	52 (1.0)	488 (2.4)	10 (0.9)	480 (4.8)	9.8 (0.05)
New Zealand	36 (1.0)	495 (3.1)	56 (0.9)	484 (3.0)	8 (0.4)	477 (6.1)	9.7 (0.04)
Singapore	36 (0.8)	626 (3.2)	51 (0.7)	598 (3.4)	13 (0.6)	587 (4.3)	9.6 (0.04)
Yemen	34 (1.8)	279 (6.8)	54 (1.6)	242 (6.1)	11 (0.9)	219 (7.4)	9.8 (0.09)
Sweden	33 (1.3)	509 (2.9)	59 (1.0)	505 (2.0)	9 (0.8)	491 (4.8)	9.5 (0.05)
Hong Kong SAR	33 (1.1)	618 (4.2)	52 (0.9)	595 (3.6)	15 (0.8)	590 (4.7)	9.5 (0.06)
Chinese Taipei	30 (1.1)	602 (3.0)	53 (0.9)	591 (2.4)	18 (1.1)	576 (3.5)	9.3 (0.06)
Belgium (Flemish)	29 (1.1)	556 (2.7)	63 (1.1)	549 (2.1)	7 (0.5)	530 (4.5)	9.4 (0.04)
Netherlands	28 (1.0)	546 (2.9)	63 (1.0)	539 (1.7)	9 (0.6)	529 (4.1)	9.4 (0.04)
Denmark	21 (1.0)	551 (3.6)	64 (1.1)	538 (2.6)	15 (0.9)	526 (3.9)	9.0 (0.04)
Finland	21 (0.9)	559 (3.1)	59 (0.9)	545 (2.5)	21 (1.0)	536 (3.3)	8.8 (0.05)
Korea, Rep. of	13 (0.7)	629 (4.0)	62 (0.9)	607 (2.0)	25 (1.1)	589 (3.3)	8.5 (0.04)
Japan	9 (0.7)	595 (3.9)	57 (1.2)	589 (2.2)	33 (1.5)	579 (2.8)	8.1 (0.05)
International Avg.	42 (0.2)	507 (0.5)	49 (0.2)	482 (0.5)	8 (0.1)	464 (1.0)	

Centerpoint of scale set at 10.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

TIMSS & PIRLS International Study Center
Lynch School of Education, Boston College

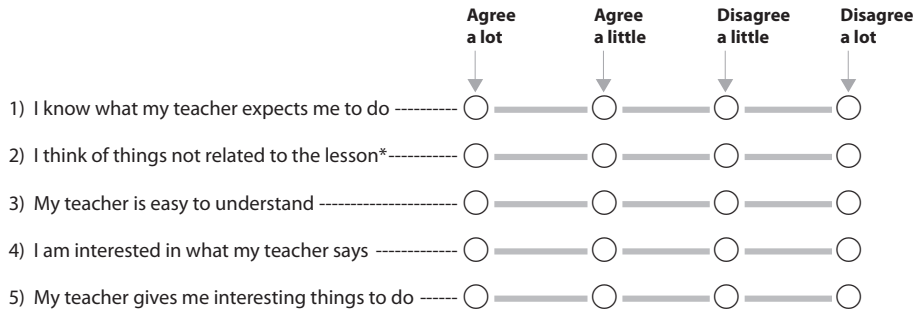
Exhibit 8.17: Students Engaged in Mathematics Lessons (Continued)

TIMSS 2011 Mathematics 4th Grade

Country	Engaged		Somewhat Engaged		Not Engaged		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Sixth Grade Participants							
Honduras	39 (1.3)	404 (5.5)	58 (1.2)	394 (6.0)	4 (0.4)	394 (11.1)	10.0 (0.05)
Yemen	38 (1.7)	365 (6.9)	55 (1.4)	343 (6.0)	7 (0.7)	322 (9.2)	10.0 (0.07)
Botswana	37 (1.2)	457 (3.6)	51 (1.0)	407 (4.1)	12 (0.8)	367 (8.3)	9.7 (0.06)
Benchmarking Participants							
Dubai, UAE	50 (1.2)	490 (2.2)	44 (1.1)	455 (2.2)	6 (0.4)	424 (7.5)	10.4 (0.05)
Abu Dhabi, UAE	48 (1.8)	438 (5.0)	46 (1.5)	405 (5.3)	7 (0.7)	375 (10.8)	10.3 (0.08)
North Carolina, US	47 (1.9)	565 (4.8)	48 (1.6)	549 (4.0)	6 (0.6)	525 (9.1)	10.2 (0.08)
Florida, US	47 (1.0)	559 (3.7)	47 (1.0)	535 (3.2)	6 (0.6)	539 (6.1)	10.2 (0.04)
Alberta, Canada	45 (1.4)	516 (2.9)	49 (1.2)	501 (3.0)	6 (0.5)	484 (7.0)	10.1 (0.06)
Ontario, Canada	43 (1.2)	529 (3.2)	50 (1.1)	512 (3.6)	7 (0.5)	499 (5.5)	10.0 (0.05)
Quebec, Canada	39 (1.1)	545 (2.6)	52 (1.0)	528 (3.1)	8 (0.6)	514 (5.0)	9.8 (0.05)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

How much do you agree with these statements about your mathematics lessons?



* Reverse coded

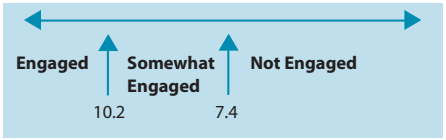


Exhibit 8.18: Students Engaged in Mathematics Lessons

TIMSS 2011 Mathematics 8th Grade

Reported by Students

Students were scored according to their degree of agreement with five statements on the *Engaged in Mathematics Lessons* scale. Students **Engaged** in mathematics lessons had a score on the scale of at least 11.4, which corresponds to their "agreeing a lot" with three of the five statements and "agreeing a little" with the other two, on average. Students who were **Not Engaged** had a score no higher than 8.3, which corresponds to their "disagreeing a little" with three of the five statements and "agreeing a little" with the other two, on average. All other students were **Somewhat Engaged** in mathematics lessons.

Country	Engaged		Somewhat Engaged		Not Engaged		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Armenia	51 (1.1)	483 (3.0)	42 (1.0)	456 (3.4)	7 (0.5)	445 (5.4)	11.4 (0.05)
Syrian Arab Republic	47 (1.3)	395 (4.8)	45 (1.1)	372 (4.9)	8 (0.7)	361 (9.8)	11.2 (0.05)
Morocco	45 (0.9)	387 (2.3)	47 (0.8)	363 (2.4)	8 (0.4)	354 (6.3)	11.1 (0.03)
Jordan	44 (1.1)	435 (3.6)	48 (0.9)	393 (4.0)	8 (0.7)	369 (8.4)	11.1 (0.05)
Tunisia	42 (0.9)	432 (2.7)	48 (0.7)	420 (3.6)	10 (0.6)	419 (4.6)	10.9 (0.04)
Georgia	42 (1.5)	458 (4.8)	49 (1.2)	423 (4.4)	9 (0.7)	408 (8.4)	11.0 (0.07)
Ghana	42 (1.2)	352 (5.0)	53 (1.1)	323 (4.4)	5 (0.4)	293 (7.5)	11.1 (0.05)
Palestinian Nat'l Auth.	42 (1.2)	427 (3.8)	49 (1.0)	395 (3.9)	9 (0.7)	362 (6.7)	11.0 (0.05)
Ukraine	39 (1.4)	493 (4.1)	52 (1.1)	478 (4.3)	10 (0.9)	446 (6.4)	10.7 (0.07)
Macedonia, Rep. of	39 (1.4)	450 (5.5)	50 (1.2)	423 (5.4)	11 (0.8)	419 (8.4)	10.8 (0.07)
Iran, Islamic Rep. of	38 (1.1)	419 (5.3)	50 (0.9)	415 (4.6)	12 (0.8)	406 (4.8)	10.7 (0.05)
Oman	38 (0.8)	401 (2.7)	54 (0.7)	355 (3.2)	9 (0.6)	311 (7.5)	10.8 (0.04)
Lebanon	35 (1.5)	459 (4.4)	52 (1.3)	447 (4.3)	13 (1.0)	433 (7.3)	10.6 (0.07)
United Arab Emirates	31 (0.8)	473 (2.2)	54 (0.7)	450 (2.4)	14 (0.6)	444 (3.5)	10.4 (0.04)
Bahrain	30 (0.9)	427 (3.0)	54 (1.1)	408 (3.2)	16 (0.8)	389 (6.1)	10.3 (0.04)
Saudi Arabia	30 (1.3)	421 (5.7)	56 (1.0)	387 (4.7)	14 (1.0)	369 (6.2)	10.3 (0.07)
Kazakhstan	29 (1.6)	501 (4.6)	62 (1.5)	485 (4.5)	9 (0.9)	472 (8.7)	10.5 (0.07)
Turkey	28 (1.0)	493 (6.8)	59 (0.9)	443 (3.5)	13 (0.7)	411 (6.0)	10.3 (0.04)
Qatar	28 (1.6)	441 (4.7)	54 (1.3)	405 (3.9)	18 (1.0)	386 (6.2)	10.2 (0.07)
Russian Federation	24 (1.2)	557 (4.8)	58 (1.2)	540 (3.8)	17 (1.0)	513 (4.4)	10.1 (0.06)
Israel	24 (0.8)	527 (4.7)	55 (0.8)	518 (4.2)	21 (0.9)	504 (5.6)	9.9 (0.04)
Malaysia	24 (1.2)	440 (5.6)	59 (0.9)	442 (5.5)	17 (1.3)	436 (8.3)	10.0 (0.07)
Romania	23 (1.1)	490 (6.1)	56 (1.0)	458 (4.3)	21 (1.0)	436 (4.3)	9.9 (0.06)
Chile	21 (0.9)	433 (4.0)	59 (0.9)	414 (2.8)	20 (1.1)	409 (4.5)	9.9 (0.05)
United States	19 (0.7)	519 (3.6)	55 (0.6)	513 (2.7)	25 (0.7)	500 (4.3)	9.7 (0.04)
Hungary	18 (1.0)	527 (5.3)	54 (1.0)	505 (3.8)	27 (1.3)	493 (4.1)	9.6 (0.06)
Thailand	18 (1.0)	432 (5.4)	71 (0.9)	426 (4.3)	10 (0.8)	435 (8.3)	10.0 (0.04)
Lithuania	17 (1.0)	516 (3.8)	57 (1.0)	503 (2.7)	25 (1.2)	496 (3.5)	9.6 (0.06)
Singapore	16 (0.7)	620 (4.7)	59 (0.8)	614 (3.9)	25 (0.9)	599 (4.8)	9.6 (0.04)
Indonesia	15 (1.2)	373 (6.6)	80 (1.1)	388 (4.1)	6 (0.7)	398 (9.1)	10.0 (0.05)
England	14 (1.0)	536 (8.6)	58 (1.2)	512 (5.4)	27 (1.7)	483 (6.6)	9.4 (0.08)
Norway	14 (0.9)	496 (4.2)	58 (0.9)	480 (2.8)	28 (1.1)	454 (3.0)	9.4 (0.05)
Australia	14 (0.9)	535 (7.7)	56 (1.4)	513 (5.5)	30 (1.5)	479 (5.7)	9.3 (0.06)
Italy	13 (0.8)	520 (4.3)	65 (0.9)	501 (2.6)	21 (1.3)	478 (3.5)	9.6 (0.05)
New Zealand	12 (0.7)	510 (6.9)	56 (1.2)	496 (5.8)	32 (1.4)	470 (5.0)	9.3 (0.06)
Hong Kong SAR	10 (0.8)	626 (6.4)	55 (1.2)	595 (4.0)	35 (1.6)	561 (4.8)	9.1 (0.07)
Sweden	8 (0.5)	510 (4.8)	59 (0.9)	491 (2.3)	33 (1.0)	470 (2.5)	9.1 (0.04)
Slovenia	7 (0.5)	526 (6.6)	59 (1.3)	508 (2.5)	34 (1.5)	495 (3.0)	9.0 (0.05)
Chinese Taipei	6 (0.5)	669 (7.5)	43 (1.4)	637 (3.9)	51 (1.7)	579 (3.7)	8.5 (0.06)
Finland	6 (0.5)	543 (5.7)	50 (1.3)	524 (2.8)	44 (1.5)	500 (2.8)	8.7 (0.06)
Japan	3 (0.4)	609 (10.5)	35 (1.5)	586 (3.7)	62 (1.7)	558 (2.9)	8.1 (0.06)
Korea, Rep. of	2 (0.2)	~ ~	34 (1.2)	644 (4.0)	64 (1.2)	594 (3.0)	8.0 (0.04)
International Avg.	25 (0.2)	484 (0.8)	54 (0.2)	468 (0.6)	21 (0.2)	449 (0.9)	

Centerpoint of scale set at 10.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

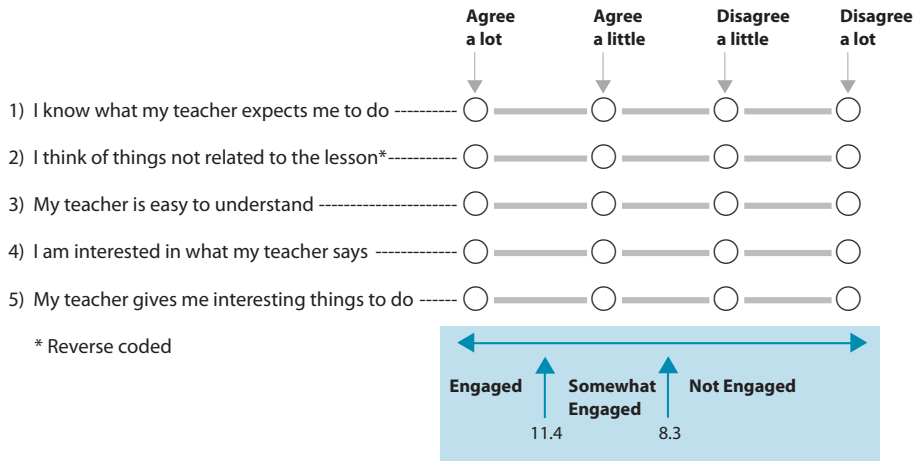
Exhibit 8.18: Students Engaged in Mathematics Lessons (Continued)

TIMSS 2011 Mathematics 8th Grade

Country	Engaged		Somewhat Engaged		Not Engaged		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Ninth Grade Participants							
Botswana	38 (1.2)	419 (2.5)	50 (0.9)	391 (2.7)	12 (0.7)	367 (6.2)	10.7 (0.05)
South Africa	35 (1.0)	366 (2.3)	54 (0.7)	352 (2.7)	10 (0.6)	346 (7.0)	10.7 (0.05)
Honduras	32 (1.2)	348 (4.3)	57 (1.1)	333 (3.8)	11 (1.0)	351 (7.7)	10.6 (0.06)
Benchmarking Participants							
Abu Dhabi, UAE	30 (1.2)	471 (3.9)	55 (1.0)	442 (4.4)	15 (1.0)	434 (6.9)	10.3 (0.06)
Dubai, UAE	29 (1.1)	488 (3.4)	54 (1.1)	477 (2.7)	16 (0.8)	466 (4.1)	10.2 (0.05)
Ontario, Canada	24 (1.2)	528 (3.4)	59 (1.1)	509 (2.9)	17 (1.1)	492 (4.9)	10.0 (0.06)
North Carolina, US	22 (1.7)	548 (8.5)	57 (1.5)	537 (7.6)	20 (2.3)	527 (8.9)	9.9 (0.11)
Connecticut, US	21 (1.5)	545 (6.3)	57 (1.2)	521 (5.0)	22 (1.6)	495 (6.2)	9.7 (0.08)
Alabama, US	19 (2.2)	471 (7.8)	54 (1.6)	464 (7.1)	27 (2.2)	470 (6.4)	9.6 (0.12)
California, US	18 (1.3)	504 (7.6)	56 (1.4)	494 (5.3)	27 (1.8)	486 (4.9)	9.6 (0.08)
Colorado, US	17 (1.7)	542 (5.9)	54 (1.7)	522 (5.2)	29 (2.5)	497 (6.5)	9.5 (0.11)
Massachusetts, US	16 (1.6)	571 (6.5)	57 (1.9)	564 (5.9)	26 (2.3)	549 (6.3)	9.5 (0.10)
Minnesota, US	16 (1.3)	563 (6.7)	58 (1.3)	549 (5.1)	26 (1.7)	527 (5.3)	9.5 (0.08)
Florida, US	15 (1.2)	528 (7.3)	57 (1.6)	517 (6.8)	28 (1.8)	505 (7.9)	9.5 (0.08)
Indiana, US	15 (1.3)	534 (7.1)	56 (1.6)	525 (5.8)	29 (2.3)	510 (6.1)	9.4 (0.10)
Alberta, Canada	14 (0.9)	513 (4.7)	59 (1.2)	510 (2.5)	27 (1.6)	490 (3.8)	9.5 (0.07)
Quebec, Canada	13 (0.8)	542 (4.1)	60 (1.0)	536 (2.4)	27 (1.4)	519 (2.7)	9.4 (0.06)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

How much do you agree with these statements about your mathematics lessons?



and benchmarking participants, students often had somewhat higher average mathematics achievement if their teachers used engaging instruction in **Most Lessons** rather than **About Half the Lessons**.

Exhibits 8.17 and 8.18 present the results for the TIMSS 2011 Engaged in Mathematics Lessons scale that looks at engagement from the student perspective. This scale asks how much students agree with the following five statements:

- I know what my teacher expects me to do;
- I think of things not related to the lesson (reverse coded);
- My teacher is easy to understand;
- I am interested in what my teacher says; and
- My teacher gives me interesting things to do.

Students considered to be **Engaged** "agreed a lot" with three of the statements and "agreed a little" with the other two, on average, whereas students in the **Not Engaged** category "agreed a little" with two statements and "disagreed a little" with the other three, on average. All other students were considered to be **Somewhat Engaged**.

At the fourth grade, internationally, on average, 42 percent of the fourth grade students reported being **Engaged** during their mathematics lessons, another 49 percent reported being **Somewhat Engaged**, and only 8 percent reported being **Not Engaged**. Across the fourth grade, sixth grade, and benchmarking participants, there was a positive relationship between students' reports about being more engaged and average mathematics achievement. **Engaged** students had higher achievement than their counterparts who reported being only **Somewhat Engaged**, and students **Not Engaged** had the lowest achievement (507 vs. 482 and 464, respectively).

At the eighth grade, internationally, on average, smaller percentages of students than at the fourth grade reported being engaged in their mathematics lessons. Only 25 percent of eighth grade students, on average, reported being **Engaged** during their mathematics lessons. The majority (54%) reported being **Somewhat Engaged** and 21 percent reported being **Not Engaged**. In general, across the eighth grade, ninth grade, and benchmarking participants, there was a direct relationship between student engagement and average mathematics achievement—the more engaged students reported being, the higher their average mathematics achievement.

Students Ready to Learn

Instruction Limited by Students Lacking Prerequisite Knowledge or Skills

The characteristics of the students themselves can be very important to the classroom atmosphere. To begin, students need the prerequisite mathematics skills before they can make gains in achievement. Because prior knowledge guides learning, effective mathematics teachers assess students' knowledge, skills, and conceptual understanding, and link new ideas, skills, and competencies to prior understandings. Lack of prerequisite knowledge and skills are psychological barriers to further mathematics learning, because it is well known that students' new learning depends on that prior knowledge: "Every new thing that a person learns must be attached to what the person already knows" (McLaughlin et al., 2005, p. 5).

Exhibit 8.19 presents teachers' reports at the fourth grade about whether their mathematics instruction was limited by students lacking prerequisite knowledge or skills. On average, internationally, 27 percent of the fourth grade students were in classes where students had the necessary prerequisite skills for mathematics instruction to proceed according to teachers' plans, and 61 percent were in classes where instruction was limited to some extent. It is consistent with teachers' reports that the students in classes where instruction was progressing unimpeded had higher average mathematics achievement than did their counterparts in classes where instruction was limited to some extent (506 vs. 489). Also consistent with teachers' reports, average mathematics achievement was substantially lower (467) for the fourth grade students in classrooms where instruction was limited "a lot" because students lacked the prerequisite knowledge or skills. This overall pattern also was evidenced at sixth grade and for the benchmarking participants.

Exhibit 8.20 presents teachers' reports at the eighth grade about whether their mathematics instruction was limited by students lacking prerequisite knowledge or skills. On average, internationally, only 15 percent of the eighth grade students were in classes where students had the necessary prerequisite skills for mathematics instruction to proceed according to teachers' plans. According to their teachers, 57 percent were in classes where instruction was limited to some extent and 28 percent in classes where instruction was limited "a lot." As students progress through school, the curriculum becomes increasingly advanced and, not surprisingly, greater percentages of students fall behind, which typically results in some differentiation in instruction for different groups of students. Especially, taking into account some type of tailored curriculum

Exhibit 8.19: Instruction Limited by Students Lacking Prerequisite Knowledge or Skills

TIMSS 2011 Mathematics 4th Grade

Reported by Teachers

Country	Students in Classrooms Where Teachers Report Instruction Is Limited by Students Lacking Prerequisite Knowledge or Skills					
	Not At All		Some		A Lot	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Kazakhstan	64 (3.6)	504 (5.3)	30 (3.6)	492 (9.9)	5 (1.8)	532 (14.0)
Japan	55 (3.9)	590 (2.4)	42 (4.0)	581 (2.8)	3 (1.3)	571 (5.9)
Russian Federation	43 (3.8)	543 (5.5)	45 (3.3)	544 (5.1)	12 (2.6)	528 (6.8)
Denmark	43 (3.8)	548 (2.8)	53 (3.8)	533 (3.6)	4 (1.4)	533 (16.5)
Norway	43 (4.6)	504 (3.9)	54 (4.8)	491 (4.2)	3 (1.7)	457 (12.8)
Finland	42 (3.5)	554 (2.6)	56 (3.5)	541 (3.4)	2 (0.5)	~ ~
Belgium (Flemish)	41 (3.3)	555 (2.7)	50 (3.4)	548 (2.8)	8 (1.8)	527 (7.1)
Slovak Republic	39 (3.5)	523 (3.6)	54 (3.4)	500 (5.3)	7 (1.3)	466 (14.1)
Azerbaijan	38 (3.6)	486 (10.1)	60 (3.7)	452 (6.4)	2 (0.8)	~ ~
Ireland	37 (3.7)	543 (3.5)	55 (4.0)	524 (4.0)	8 (1.9)	480 (7.1)
Georgia	36 (3.5)	455 (6.8)	62 (3.6)	450 (5.0)	2 (0.7)	~ ~
Croatia	35 (3.2)	492 (3.1)	61 (3.4)	489 (2.8)	4 (1.6)	487 (11.8)
Slovenia	33 (3.9)	527 (3.6)	57 (3.7)	509 (2.6)	11 (2.3)	494 (3.5)
Sweden r	32 (4.2)	513 (4.3)	61 (4.3)	504 (3.1)	7 (1.6)	481 (6.4)
Netherlands r	32 (4.1)	551 (2.9)	62 (4.3)	534 (2.9)	6 (2.3)	527 (9.0)
Australia r	31 (3.2)	543 (7.1)	60 (4.1)	513 (4.1)	10 (2.4)	479 (6.7)
Austria	30 (3.1)	520 (3.0)	56 (2.7)	509 (3.1)	14 (2.6)	477 (5.1)
Hungary	28 (3.1)	539 (7.5)	62 (3.2)	511 (4.7)	9 (2.1)	464 (13.5)
Spain	28 (3.7)	497 (4.6)	62 (3.7)	482 (3.1)	10 (2.2)	444 (10.3)
Romania	28 (3.5)	507 (8.6)	67 (3.5)	475 (7.1)	5 (1.4)	415 (51.0)
Korea, Rep. of	28 (3.9)	608 (4.3)	57 (4.1)	606 (2.5)	15 (3.0)	594 (4.9)
Czech Republic	28 (3.8)	520 (3.8)	69 (3.7)	509 (2.8)	3 (1.3)	461 (30.6)
Singapore	27 (2.6)	642 (5.7)	58 (3.0)	603 (3.5)	15 (2.1)	549 (8.3)
Qatar	27 (4.5)	442 (10.0)	62 (5.1)	408 (5.4)	10 (2.2)	366 (10.9)
Hong Kong SAR	27 (4.0)	618 (5.6)	65 (4.5)	601 (3.4)	8 (2.4)	559 (16.4)
Armenia	26 (3.3)	456 (6.8)	70 (3.4)	451 (4.4)	4 (1.7)	451 (21.8)
Northern Ireland r	26 (3.6)	574 (7.4)	68 (3.9)	560 (4.2)	6 (2.1)	543 (14.9)
Serbia	24 (3.4)	530 (5.1)	70 (3.6)	514 (3.5)	6 (2.5)	487 (16.8)
Portugal	24 (3.5)	544 (5.4)	65 (3.9)	530 (4.7)	10 (2.1)	516 (7.8)
New Zealand	24 (3.1)	503 (5.8)	64 (3.0)	486 (2.8)	12 (1.6)	453 (7.6)
England	23 (3.3)	578 (7.3)	65 (4.1)	541 (4.3)	13 (2.9)	501 (10.0)
Germany	23 (3.3)	541 (3.6)	68 (3.4)	528 (2.7)	9 (1.9)	498 (11.0)
United Arab Emirates	22 (2.0)	465 (5.7)	65 (2.2)	429 (3.4)	13 (1.6)	408 (8.8)
Italy	21 (2.4)	499 (6.3)	55 (3.7)	513 (3.7)	24 (3.4)	509 (6.2)
Poland	20 (2.9)	486 (5.9)	71 (3.4)	482 (2.3)	10 (2.0)	467 (7.7)
Chinese Taipei	19 (3.1)	600 (4.5)	74 (3.5)	591 (2.4)	7 (2.1)	568 (10.6)
Oman	19 (1.9)	398 (5.2)	55 (2.8)	384 (4.3)	26 (2.7)	381 (5.3)
Malta	17 (0.1)	508 (2.3)	64 (0.1)	497 (1.7)	19 (0.1)	480 (3.0)
Saudi Arabia	17 (3.1)	430 (10.4)	60 (4.1)	410 (7.2)	23 (3.2)	398 (9.6)
Lithuania	16 (2.1)	549 (6.5)	74 (2.7)	532 (2.8)	10 (2.1)	521 (5.8)
Iran, Islamic Rep. of	16 (2.6)	467 (8.9)	64 (3.7)	430 (5.0)	20 (2.9)	401 (8.8)
United States r	16 (2.5)	566 (4.8)	65 (2.9)	544 (2.5)	19 (1.9)	518 (4.1)
Bahrain	15 (3.6)	473 (11.3)	72 (4.2)	433 (4.6)	13 (2.5)	411 (6.0)
Chile	15 (3.1)	482 (9.4)	65 (3.9)	462 (4.2)	20 (3.2)	450 (8.7)
Yemen	14 (2.6)	268 (16.5)	62 (4.2)	247 (7.3)	25 (4.1)	236 (11.8)
Kuwait	12 (2.7)	347 (8.5)	70 (3.5)	341 (4.1)	17 (2.9)	340 (8.1)
Thailand	12 (2.3)	500 (12.3)	70 (3.8)	459 (5.0)	18 (3.4)	432 (12.9)
Morocco	10 (2.3)	343 (12.0)	52 (4.4)	346 (8.4)	38 (4.5)	326 (5.4)
Tunisia	8 (1.7)	376 (9.9)	61 (4.3)	366 (5.2)	31 (4.1)	344 (7.0)
Turkey	6 (1.7)	510 (13.1)	60 (3.5)	481 (6.6)	34 (3.4)	441 (7.8)
International Avg.	27 (0.5)	506 (1.0)	61 (0.5)	489 (0.6)	12 (0.3)	467 (1.9)

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A tilde (~) indicates insufficient data to report achievement.
An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 8.19: Instruction Limited by Students Lacking Prerequisite Knowledge or Skills (Continued)

Country	Students in Classrooms Where Teachers Report Instruction Is Limited by Students Lacking Prerequisite Knowledge or Skills					
	Not At All		Some		A Lot	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Sixth Grade Participants						
Honduras	20 (3.7)	422 (16.9)	68 (4.1)	386 (6.1)	12 (2.8)	404 (12.8)
Yemen	13 (2.9)	351 (16.7)	67 (4.4)	351 (6.9)	20 (3.7)	336 (13.5)
Botswana	6 (2.3)	494 (27.7)	56 (4.3)	428 (4.9)	38 (4.0)	398 (5.5)
Benchmarking Participants						
Dubai, UAE r	34 (3.8)	492 (7.3)	60 (3.9)	463 (5.0)	6 (1.2)	463 (14.4)
Quebec, Canada	27 (3.9)	550 (4.4)	58 (4.8)	528 (2.8)	15 (2.9)	520 (4.4)
Abu Dhabi, UAE	23 (3.6)	440 (9.8)	66 (4.3)	414 (5.8)	12 (2.9)	403 (20.0)
Alberta, Canada r	18 (3.9)	514 (7.6)	67 (4.7)	508 (2.8)	15 (3.2)	489 (9.2)
Ontario, Canada	16 (2.6)	540 (4.6)	66 (3.7)	520 (3.8)	18 (3.0)	495 (5.5)
Florida, US r	12 (3.1)	573 (14.6)	65 (5.2)	548 (3.9)	23 (4.9)	520 (6.3)
North Carolina, US	7 (2.2)	595 (14.7)	62 (4.9)	556 (5.2)	32 (4.9)	541 (7.1)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 8.20: Instruction Limited by Students Lacking Prerequisite Knowledge or Skills

TIMSS 2011 8th Grade Mathematics

Reported by Teachers

Country		Students in Classrooms Where Teachers Report Instruction Is Limited by Students Lacking Prerequisite Knowledge or Skills					
		Not At All		Some		A Lot	
		Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Kazakhstan		54 (3.6)	494 (5.6)	36 (3.5)	480 (7.0)	10 (2.5)	479 (12.5)
Japan		42 (3.9)	590 (4.1)	53 (3.9)	557 (3.6)	6 (1.8)	538 (10.2)
Korea, Rep. of		30 (2.6)	623 (6.5)	52 (3.1)	612 (4.7)	18 (2.6)	598 (6.4)
Lebanon		28 (3.8)	461 (6.9)	57 (4.5)	446 (5.7)	15 (3.0)	440 (10.2)
Russian Federation		27 (3.0)	568 (6.7)	43 (3.0)	536 (5.3)	30 (3.1)	518 (6.1)
Israel		27 (3.0)	560 (8.4)	52 (2.9)	519 (5.7)	21 (2.6)	469 (8.8)
Malaysia		26 (3.5)	465 (12.9)	52 (3.6)	449 (6.0)	22 (3.4)	391 (10.1)
England		24 (3.3)	552 (9.0)	60 (4.4)	507 (6.3)	15 (3.1)	428 (13.6)
Sweden	r	24 (3.0)	509 (4.3)	59 (3.4)	485 (2.6)	17 (2.6)	457 (5.2)
Singapore		22 (2.0)	659 (6.7)	64 (2.6)	605 (4.3)	14 (2.0)	561 (11.0)
Australia	r	19 (3.0)	567 (12.1)	62 (4.0)	507 (6.5)	19 (2.9)	452 (8.7)
Qatar		18 (3.0)	431 (15.7)	62 (2.8)	411 (5.5)	20 (2.4)	385 (7.3)
Finland		17 (3.0)	539 (4.1)	68 (3.3)	515 (2.3)	15 (2.9)	484 (6.7)
Macedonia, Rep. of	r	16 (2.6)	397 (11.6)	58 (3.8)	436 (7.4)	26 (3.9)	413 (13.5)
Ghana		15 (3.0)	342 (9.9)	70 (3.7)	332 (5.5)	15 (2.9)	311 (5.7)
Italy		15 (2.9)	516 (6.4)	59 (3.6)	505 (3.1)	26 (3.5)	477 (6.4)
Hong Kong SAR		15 (3.1)	613 (12.4)	72 (4.0)	596 (5.0)	13 (2.3)	485 (14.2)
New Zealand		15 (3.5)	534 (7.2)	59 (3.7)	492 (7.7)	26 (2.7)	453 (5.9)
Slovenia		14 (2.0)	538 (5.3)	66 (2.5)	507 (2.2)	19 (1.9)	476 (5.2)
United Arab Emirates		14 (1.6)	472 (7.6)	72 (2.1)	457 (3.0)	15 (1.5)	430 (5.5)
Norway		13 (2.9)	486 (4.0)	67 (4.2)	477 (3.0)	20 (3.4)	462 (4.6)
Hungary		13 (2.1)	550 (9.8)	70 (3.2)	506 (3.6)	17 (2.7)	462 (9.4)
United States	r	12 (1.7)	566 (10.5)	59 (2.5)	516 (3.5)	29 (2.3)	480 (4.6)
Chinese Taipei		12 (2.4)	647 (14.7)	46 (3.7)	617 (4.6)	43 (3.8)	591 (5.9)
Morocco		11 (1.8)	399 (9.0)	38 (2.9)	385 (3.7)	51 (3.1)	355 (3.2)
Chile		11 (2.2)	446 (7.4)	40 (4.2)	438 (5.8)	49 (4.1)	394 (4.3)
Romania		11 (2.4)	507 (21.5)	61 (3.6)	457 (5.0)	28 (3.6)	441 (7.3)
Saudi Arabia		10 (2.7)	405 (16.2)	57 (4.1)	401 (5.4)	33 (4.0)	383 (8.2)
Lithuania		10 (2.1)	529 (13.6)	61 (3.3)	506 (3.9)	30 (3.1)	488 (4.8)
Ukraine		8 (2.3)	498 (9.3)	49 (4.7)	485 (6.3)	43 (4.4)	469 (6.6)
Bahrain		8 (0.8)	435 (8.5)	55 (1.9)	415 (3.6)	37 (2.0)	397 (4.4)
Syrian Arab Republic		8 (2.2)	395 (15.2)	60 (4.3)	382 (5.7)	32 (4.2)	369 (8.8)
Thailand		7 (2.0)	467 (22.7)	63 (4.2)	429 (6.4)	30 (4.1)	412 (5.7)
Armenia		7 (1.6)	476 (9.0)	75 (3.4)	466 (3.7)	18 (3.2)	461 (9.1)
Oman		6 (1.0)	372 (12.0)	49 (3.6)	379 (4.4)	45 (3.6)	351 (4.5)
Jordan		6 (1.3)	428 (14.9)	48 (4.4)	413 (6.1)	46 (4.4)	395 (6.1)
Tunisia		5 (1.7)	419 (7.0)	54 (3.8)	431 (4.3)	40 (3.9)	417 (3.8)
Georgia		5 (1.5)	425 (26.8)	70 (3.4)	437 (5.3)	25 (3.1)	412 (7.2)
Palestinian Nat'l Auth.		5 (1.8)	400 (14.3)	43 (4.3)	417 (5.7)	53 (4.4)	395 (5.7)
Iran, Islamic Rep. of		5 (1.3)	423 (20.5)	50 (3.5)	424 (6.6)	45 (3.2)	404 (5.4)
Indonesia		5 (1.7)	407 (12.4)	58 (4.6)	393 (5.4)	38 (4.6)	372 (8.0)
Turkey		2 (1.0)	~ ~	34 (3.2)	476 (7.4)	64 (3.2)	437 (4.4)
International Avg.		15 (0.4)	490 (1.9)	57 (0.6)	471 (0.8)	28 (0.5)	443 (1.2)

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 8.20: Instruction Limited by Students Lacking Prerequisite Knowledge or Skills (Continued)

Country		Students in Classrooms Where Teachers Report Instruction Is Limited by Students Lacking Prerequisite Knowledge or Skills					
		Not At All		Some		A Lot	
		Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Ninth Grade Participants							
Botswana		11 (2.6)	413 (9.2)	43 (3.9)	402 (3.6)	46 (4.0)	387 (3.6)
Honduras	r	9 (2.9)	335 (18.0)	54 (4.8)	348 (7.0)	36 (4.4)	323 (5.5)
South Africa		7 (1.4)	365 (11.7)	59 (3.4)	347 (4.0)	34 (3.0)	361 (4.3)
Benchmarking Participants							
Quebec, Canada		21 (3.5)	570 (5.0)	46 (4.2)	530 (3.5)	34 (3.7)	513 (5.2)
Dubai, UAE		19 (2.4)	503 (10.8)	66 (3.5)	476 (3.3)	15 (2.6)	445 (9.0)
Massachusetts, US	r	18 (5.1)	592 (12.0)	59 (6.3)	564 (8.8)	23 (5.2)	533 (9.3)
Connecticut, US	r	18 (4.5)	547 (16.6)	60 (5.6)	530 (7.4)	22 (4.6)	489 (14.4)
Ontario, Canada		16 (2.3)	526 (4.8)	66 (3.5)	513 (3.4)	18 (2.7)	503 (7.1)
North Carolina, US	r	15 (4.8)	581 (22.8)	55 (6.4)	542 (9.6)	30 (5.3)	510 (8.1)
California, US	s	12 (4.6)	536 (16.3)	47 (6.8)	509 (9.7)	40 (6.1)	458 (8.4)
Florida, US	r	12 (3.0)	596 (7.9)	48 (6.8)	519 (9.4)	40 (6.4)	495 (11.3)
Alberta, Canada		12 (2.5)	528 (7.9)	72 (3.3)	503 (3.3)	17 (2.5)	497 (5.4)
Minnesota, US	r	12 (3.1)	595 (10.3)	63 (3.8)	557 (6.8)	25 (4.6)	500 (10.9)
Abu Dhabi, UAE		10 (2.3)	466 (17.0)	75 (3.5)	452 (4.7)	15 (2.8)	427 (8.2)
Indiana, US	r	10 (3.5)	593 (10.4)	68 (5.6)	514 (6.5)	22 (4.5)	492 (11.6)
Colorado, US	r	6 (2.5)	562 (31.2)	56 (5.4)	540 (6.7)	38 (5.1)	475 (8.9)
Alabama, US	r	4 (2.8)	551 (7.0)	63 (5.5)	479 (10.4)	34 (5.8)	435 (7.6)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

and instruction for groups of students, it is distressing that, according to their teachers, relatively few students at the eighth grade are receiving the full instructional benefit that could be provided.

Eighth grade students in classes where instruction was not limited had higher average mathematics achievement than did their counterparts in classes where instruction was limited to some extent (490 vs. 471). Also consistent with teachers' reports, average mathematics achievement was substantially lower (443) for the eighth grade students in classrooms where instruction was limited "a lot" because students lacked the prerequisite knowledge or skills. This pattern also was evidenced at the ninth grade and for the benchmarking participants.

Instruction Limited by Students Suffering from Lack of Nutrition or Sleep

The importance of a healthy breakfast is widely advertised, including the benefit of doing better in school. Unfortunately, some children in many countries around the world suffer from hunger, and a growing body of research, mostly in developing countries, is providing evidence that malnutrition has a negative impact on educational achievement. Similarly, a number of studies in a variety of countries have shown sleep duration and quality to be related to academic functioning at school. For example, a Dutch researcher found that chronic sleep reduction can affect school achievement directly and indirectly via motivation and engagement (Meijer, 2008).

Exhibit 8.21 presents teachers' reports at the fourth grade about the degree to which their mathematics instruction was limited by students' lack of nutrition or not having enough sleep. On average, internationally, 71 percent of the fourth grade students were in classrooms where instruction was "not at all" limited because students were lacking in basic nutrition. These fourth grade students had higher average mathematics achievement than their peers in classrooms where instruction was limited "some" or "a lot" due to lack of basic nutrition (498 vs. 472). It is of considerable concern that 29 percent of fourth grade students, on average, were reported to be suffering from lack of basic nutrition; and this percentage is much higher in some countries, including those that participated at the sixth grade.

Teachers reported that 53 percent of the fourth grade students, on average, were in classrooms where instruction was "not at all" limited by students suffering from not enough sleep. However, it is unfortunate that 47 percent, on average, were in classrooms where instruction was limited "some" or "a lot" by students suffering from lack of sleep. The achievement gap for sleep

deprivation was somewhat less than that related to lack of nutrition, but the fourth grade students suffering from some amount of sleep deprivation did have lower average mathematics achievement than their more alert counterparts (by 11 points on average). Again, there was considerable variation across countries in teachers' reports about the percentages of fourth grade students suffering from not enough sleep. According to their teachers, in a number of TIMSS 2011 countries and benchmarking participants, the majority of students were at least somewhat sleep deprived.

Exhibit 8.22 presents the eighth grade teachers' reports about the degree to which their instruction was limited by students' lack of nutrition or not having enough sleep. On average, internationally, 63 percent of the eighth grade students were in classrooms where instruction was "not at all" limited because students were lacking in basic nutrition. These eighth grade students had higher average mathematics achievement than their peers in classrooms where instruction was limited "some" or "a lot" due to lack of basic nutrition (477 vs. 449). More than one-third (37%) of the eighth grade students, on average, were reported to be suffering from lack of basic nutrition; and this percentage was much higher in some countries, including those that participated at the ninth grade.

Teachers reported that 43 percent of the eighth grade students, on average, were in classrooms where instruction was "not at all" limited by students suffering from not enough sleep. However, again, it is a matter of considerable concern that the majority of eighth grade students (57%), on average, were in classrooms where instruction was limited "some" or "a lot" by students suffering from lack of sleep. Similar to the results at the fourth grade, the achievement gap for sleep deprivation was somewhat less than that related to lack of nutrition, but the eighth grade students suffering from some amount of sleep deprivation did have lower average mathematics achievement than their counterparts (by 16 points). Again, there was considerable variation across countries in teachers' reports about the percentages of eighth grade students suffering from not enough sleep. According to their teachers, however, in a number of TIMSS 2011 countries and benchmarking participants, at least two-thirds of students were at least somewhat sleep deprived.

Exhibit 8.21: Instruction Limited by Students Suffering from Lack of Nutrition or Sleep

TIMSS 2011 Mathematics 4th Grade

Reported by Teachers

Country		Students in Classrooms Where Teachers Report Instruction Is Limited by Students Suffering from Lack of Basic Nutrition				Students in Classrooms Where Teachers Report Instruction Is Limited by Students Suffering from Not Enough Sleep			
		Not At All		Some or A Lot		Not At All		Some or A Lot	
		Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Armenia		33 (3.9)	462 (6.6)	67 (3.9)	448 (4.5)	52 (4.6)	458 (5.7)	48 (4.6)	444 (5.2)
Australia	r	73 (3.0)	531 (3.7)	27 (3.0)	486 (6.7)	r 33 (3.5)	539 (6.2)	67 (3.5)	509 (5.1)
Austria		– –	– –	– –	– –	40 (3.5)	518 (3.0)	60 (3.5)	501 (3.3)
Azerbaijan		59 (3.2)	475 (7.7)	41 (3.2)	452 (9.2)	84 (2.9)	466 (6.5)	16 (2.9)	458 (11.6)
Bahrain		57 (4.4)	448 (5.0)	43 (4.4)	421 (4.6)	52 (4.8)	441 (5.4)	48 (4.8)	431 (5.1)
Belgium (Flemish)		95 (1.5)	551 (2.0)	5 (1.5)	518 (8.0)	62 (3.6)	554 (2.5)	38 (3.6)	542 (3.1)
Chile		58 (3.5)	477 (3.5)	42 (3.5)	442 (5.2)	37 (4.3)	482 (5.5)	63 (4.3)	451 (4.6)
Chinese Taipei		71 (3.7)	593 (2.4)	29 (3.7)	587 (4.4)	40 (4.0)	587 (3.4)	60 (4.0)	594 (2.9)
Croatia		83 (2.8)	491 (2.1)	17 (2.8)	487 (6.5)	44 (3.5)	488 (2.9)	56 (3.5)	492 (2.7)
Czech Republic		99 (0.9)	510 (2.4)	1 (0.9)	~ ~	65 (3.6)	512 (3.0)	35 (3.6)	507 (4.3)
Denmark		86 (2.4)	542 (2.7)	14 (2.4)	524 (6.0)	53 (3.7)	542 (3.6)	47 (3.7)	537 (3.6)
England		78 (3.1)	554 (4.3)	22 (3.1)	513 (6.5)	36 (4.6)	569 (5.1)	64 (4.6)	531 (4.9)
Finland		91 (2.1)	548 (2.3)	9 (2.1)	526 (8.4)	40 (3.9)	552 (3.9)	60 (3.9)	542 (2.5)
Georgia		46 (3.9)	464 (5.3)	54 (3.9)	441 (6.1)	65 (4.1)	450 (4.6)	35 (4.1)	451 (7.0)
Germany		86 (2.7)	532 (2.3)	14 (2.7)	507 (5.5)	53 (3.5)	537 (2.6)	47 (3.5)	519 (3.4)
Hong Kong SAR		89 (2.5)	607 (2.7)	11 (2.5)	560 (17.9)	55 (4.4)	611 (4.1)	45 (4.4)	591 (4.5)
Hungary		77 (2.9)	523 (3.6)	23 (2.9)	485 (9.3)	51 (3.5)	524 (5.0)	49 (3.5)	504 (5.8)
Iran, Islamic Rep. of		30 (3.6)	458 (6.9)	70 (3.6)	419 (4.1)	41 (3.6)	436 (5.5)	59 (3.6)	427 (4.6)
Ireland		79 (3.0)	533 (3.2)	21 (3.0)	509 (5.9)	38 (3.6)	541 (4.3)	62 (3.6)	519 (3.5)
Italy		71 (3.4)	508 (3.5)	29 (3.4)	511 (4.8)	48 (4.5)	508 (4.5)	52 (4.5)	511 (3.8)
Japan		99 (0.6)	586 (1.7)	1 (0.6)	~ ~	80 (3.0)	586 (1.9)	20 (3.0)	583 (4.3)
Kazakhstan		81 (3.2)	502 (5.4)	19 (3.2)	503 (10.9)	88 (2.9)	499 (4.9)	12 (2.9)	521 (13.1)
Korea, Rep. of		81 (3.3)	607 (2.4)	19 (3.3)	596 (3.4)	71 (3.5)	606 (2.4)	29 (3.5)	602 (3.5)
Kuwait		60 (4.0)	346 (4.7)	40 (4.0)	336 (5.2)	31 (3.5)	349 (6.2)	69 (3.5)	338 (4.2)
Lithuania		81 (2.9)	536 (3.0)	19 (2.9)	520 (5.2)	51 (3.0)	540 (3.7)	49 (3.0)	528 (3.1)
Malta		88 (0.1)	500 (1.7)	12 (0.1)	468 (3.7)	74 (0.1)	500 (1.9)	26 (0.1)	484 (2.2)
Morocco		21 (3.3)	370 (11.2)	79 (3.3)	330 (6.1)	39 (3.9)	346 (6.6)	61 (3.9)	333 (6.2)
Netherlands	r	91 (2.6)	541 (2.5)	9 (2.6)	523 (8.1)	r 54 (4.3)	545 (2.3)	46 (4.3)	532 (3.1)
New Zealand		63 (2.7)	505 (3.0)	37 (2.7)	456 (3.7)	31 (2.9)	507 (5.3)	69 (2.9)	478 (3.0)
Northern Ireland	r	81 (2.9)	571 (3.9)	19 (2.9)	532 (6.8)	r 41 (4.8)	580 (4.4)	59 (4.8)	551 (5.0)
Norway		80 (3.6)	496 (3.0)	20 (3.6)	491 (7.3)	64 (4.1)	495 (3.4)	36 (4.1)	495 (4.9)
Oman		41 (2.7)	399 (4.3)	59 (2.7)	377 (3.9)	44 (3.1)	397 (4.0)	56 (3.1)	377 (4.2)
Poland		88 (2.2)	481 (2.3)	12 (2.2)	477 (4.8)	62 (3.1)	482 (2.8)	38 (3.1)	480 (3.4)
Portugal		86 (2.8)	533 (3.6)	14 (2.8)	531 (10.9)	67 (4.0)	534 (4.6)	33 (4.0)	528 (6.4)
Qatar		67 (3.1)	429 (5.6)	33 (3.1)	379 (7.8)	47 (4.2)	400 (7.0)	53 (4.2)	423 (5.5)
Romania		50 (3.6)	501 (6.8)	50 (3.6)	461 (8.4)	62 (3.8)	485 (5.9)	38 (3.8)	475 (10.0)
Russian Federation		83 (2.6)	547 (3.9)	17 (2.6)	517 (6.8)	73 (2.7)	545 (4.0)	27 (2.7)	534 (6.8)
Saudi Arabia		51 (4.2)	415 (8.1)	49 (4.2)	406 (8.0)	32 (3.7)	427 (10.7)	68 (3.7)	403 (5.2)
Serbia		84 (2.8)	517 (3.1)	16 (2.8)	518 (8.0)	52 (4.0)	516 (4.1)	48 (4.0)	519 (3.8)
Singapore		83 (2.1)	614 (3.3)	17 (2.1)	564 (9.5)	55 (3.0)	613 (4.2)	45 (3.0)	596 (5.0)
Slovak Republic		96 (1.1)	508 (3.8)	4 (1.1)	476 (18.8)	79 (2.7)	512 (3.6)	21 (2.7)	488 (9.7)
Slovenia		88 (2.0)	515 (2.2)	12 (2.0)	497 (5.2)	48 (4.5)	518 (2.8)	52 (4.5)	509 (2.9)
Spain		89 (2.3)	484 (3.1)	11 (2.3)	470 (7.0)	62 (3.9)	488 (3.7)	38 (3.9)	474 (4.4)
Sweden	r	97 (1.3)	506 (2.6)	3 (1.3)	495 (9.3)	r 59 (3.8)	509 (3.1)	41 (3.8)	500 (4.0)
Thailand		70 (4.1)	467 (5.2)	30 (4.1)	440 (9.1)	68 (4.2)	463 (5.4)	32 (4.2)	451 (8.9)
Tunisia		47 (3.1)	372 (5.7)	53 (3.1)	348 (5.4)	61 (4.1)	363 (4.9)	39 (4.1)	354 (6.4)
Turkey		26 (2.8)	492 (9.1)	74 (2.8)	461 (5.6)	35 (3.0)	472 (5.9)	65 (3.0)	468 (6.2)
United Arab Emirates		62 (2.3)	452 (2.8)	38 (2.3)	407 (3.4)	49 (2.6)	450 (4.1)	51 (2.6)	420 (3.8)
United States	r	61 (2.4)	551 (2.6)	39 (2.4)	529 (3.0)	r 27 (2.4)	555 (4.6)	73 (2.4)	537 (2.2)
Yemen		21 (3.7)	266 (16.8)	79 (3.7)	242 (6.4)	54 (4.6)	254 (8.6)	46 (4.6)	238 (7.6)
International Avg.		71 (0.4)	498 (0.7)	29 (0.4)	472 (1.1)	53 (0.5)	497 (0.7)	47 (0.5)	486 (0.8)

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (–) indicates comparable data not available. A tilde (~) indicates insufficient data to report achievement.
An "r" indicates data are available for at least 70 but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 8.21: Instruction Limited by Students Suffering from Lack of Nutrition or Sleep (Continued)

TIMSS 2011 Mathematics 4th Grade

Country	Students in Classrooms Where Teachers Report Instruction Is Limited by Students Suffering from Lack of Basic Nutrition				Students in Classrooms Where Teachers Report Instruction Is Limited by Students Suffering from Not Enough Sleep			
	Not At All		Some or A Lot		Not At All		Some or A Lot	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Sixth Grade Participants								
Botswana	53 (3.9)	435 (6.7)	47 (3.9)	404 (4.6)	37 (4.2)	430 (6.4)	63 (4.2)	415 (5.1)
Honduras	28 (4.0)	430 (10.6)	72 (4.0)	384 (6.3)	64 (4.3)	404 (6.5)	36 (4.3)	383 (10.1)
Yemen	17 (3.0)	380 (12.8)	83 (3.0)	342 (6.1)	54 (4.7)	361 (7.2)	46 (4.7)	334 (8.9)
Benchmarking Participants								
Alberta, Canada	r 59 (4.6)	514 (3.2)	41 (4.6)	494 (4.1)	r 28 (4.4)	525 (5.3)	72 (4.4)	499 (2.5)
Ontario, Canada	63 (3.7)	530 (3.5)	37 (3.7)	501 (4.4)	27 (3.5)	531 (4.9)	73 (3.5)	514 (3.5)
Quebec, Canada	73 (3.5)	537 (2.8)	27 (3.5)	520 (4.4)	35 (3.8)	542 (3.4)	65 (3.8)	528 (2.7)
Abu Dhabi, UAE	62 (4.3)	431 (6.2)	38 (4.3)	398 (7.6)	47 (4.8)	436 (7.5)	53 (4.8)	403 (6.6)
Dubai, UAE	r 78 (1.8)	490 (3.1)	22 (1.8)	409 (7.2)	r 62 (3.1)	484 (4.3)	38 (3.1)	452 (5.8)
Florida, US	r 66 (4.5)	550 (5.2)	34 (4.5)	534 (5.8)	r 28 (4.0)	556 (6.8)	72 (4.0)	541 (4.4)
North Carolina, US	66 (5.6)	559 (4.4)	34 (5.6)	544 (8.2)	21 (3.2)	560 (8.1)	79 (3.2)	553 (5.1)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 8.22: Instruction Limited by Students Suffering from Lack of Nutrition or Sleep

TIMSS 2011 8th Grade Mathematics

Reported by Teachers

Country	Students in Classrooms Where Teachers Report Instruction Is Limited by Students Suffering from Lack of Basic Nutrition				Students in Classrooms Where Teachers Report Instruction Is Limited by Students Suffering from Not Enough Sleep			
	Not At All		Some or A Lot		Not At All		Some or A Lot	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Armenia	31 (3.2)	472 (6.1)	69 (3.2)	463 (3.7)	49 (3.6)	469 (5.2)	51 (3.6)	463 (4.8)
Australia	r 75 (2.7)	524 (6.6)	25 (2.7)	461 (5.1)	r 38 (3.6)	533 (8.5)	62 (3.6)	493 (7.5)
Bahrain	47 (3.1)	437 (4.7)	53 (3.1)	386 (3.6)	33 (2.6)	439 (6.1)	67 (2.6)	396 (2.9)
Chile	51 (4.2)	440 (4.8)	49 (4.2)	395 (4.6)	26 (3.4)	441 (6.9)	74 (3.4)	409 (3.9)
Chinese Taipei	78 (3.3)	607 (3.5)	22 (3.3)	618 (10.3)	24 (3.5)	610 (8.6)	76 (3.5)	609 (4.1)
England	86 (2.6)	516 (5.9)	14 (2.6)	446 (10.1)	44 (4.3)	540 (8.0)	56 (4.3)	478 (7.1)
Finland	84 (2.6)	515 (2.9)	16 (2.6)	510 (5.7)	19 (2.9)	530 (4.0)	81 (2.9)	511 (2.7)
Georgia	45 (3.8)	442 (6.0)	55 (3.8)	422 (5.2)	49 (3.8)	426 (7.2)	51 (3.8)	435 (4.7)
Ghana	39 (4.2)	346 (7.8)	61 (4.2)	319 (5.4)	33 (4.3)	343 (7.6)	67 (4.3)	323 (5.5)
Hong Kong SAR	84 (3.1)	588 (4.4)	16 (3.1)	576 (13.9)	27 (4.2)	604 (10.2)	73 (4.2)	578 (5.1)
Hungary	80 (2.5)	511 (3.5)	20 (2.5)	477 (10.5)	37 (3.4)	513 (6.1)	63 (3.4)	499 (4.8)
Indonesia	61 (4.5)	394 (5.2)	39 (4.5)	373 (9.0)	50 (4.6)	391 (5.8)	50 (4.6)	380 (7.7)
Iran, Islamic Rep. of	29 (3.5)	448 (7.3)	71 (3.5)	402 (5.3)	30 (3.6)	410 (7.8)	70 (3.6)	417 (5.7)
Israel	82 (2.2)	530 (4.4)	18 (2.2)	475 (9.8)	47 (3.2)	541 (6.4)	53 (3.2)	502 (6.6)
Italy	90 (2.4)	501 (2.4)	10 (2.4)	483 (12.1)	68 (3.9)	500 (3.2)	32 (3.9)	497 (5.4)
Japan	99 (0.7)	570 (2.6)	1 (0.7)	~ ~	66 (4.1)	571 (3.1)	34 (4.1)	566 (6.7)
Jordan	27 (3.7)	417 (7.9)	73 (3.7)	402 (4.5)	40 (3.7)	409 (7.0)	60 (3.7)	404 (5.4)
Kazakhstan	79 (3.8)	493 (4.6)	21 (3.8)	465 (9.8)	82 (3.4)	489 (4.1)	18 (3.4)	478 (12.1)
Korea, Rep. of	72 (2.4)	616 (3.5)	28 (2.4)	605 (4.8)	37 (2.8)	616 (6.0)	63 (2.8)	611 (3.6)
Lebanon	66 (4.0)	450 (4.9)	34 (4.0)	446 (7.1)	53 (4.2)	453 (5.2)	47 (4.2)	446 (6.1)
Lithuania	84 (2.7)	505 (3.2)	16 (2.7)	489 (6.0)	52 (3.8)	506 (4.0)	48 (3.8)	498 (4.0)
Macedonia, Rep. of	r 71 (4.7)	431 (7.6)	29 (4.7)	413 (11.0)	r 47 (4.6)	422 (10.2)	53 (4.6)	429 (7.8)
Malaysia	62 (3.5)	456 (5.8)	38 (3.5)	415 (8.5)	54 (3.7)	447 (8.2)	46 (3.7)	434 (7.9)
Morocco	32 (3.2)	392 (4.8)	68 (3.2)	361 (2.5)	37 (3.0)	376 (4.1)	63 (3.0)	369 (2.9)
New Zealand	73 (3.3)	499 (6.4)	27 (3.3)	461 (9.0)	38 (3.9)	500 (8.5)	62 (3.9)	482 (6.8)
Norway	60 (4.1)	480 (2.9)	40 (4.1)	467 (3.4)	33 (4.0)	487 (3.0)	67 (4.0)	469 (2.9)
Oman	36 (3.1)	382 (5.8)	64 (3.1)	357 (3.8)	56 (3.6)	375 (4.9)	44 (3.6)	354 (5.2)
Palestinian Nat'l Auth.	19 (3.2)	422 (6.7)	81 (3.2)	400 (4.0)	18 (3.2)	408 (8.1)	82 (3.2)	403 (4.1)
Qatar	56 (3.4)	431 (6.7)	44 (3.4)	382 (5.9)	39 (4.2)	426 (8.8)	61 (4.2)	398 (6.4)
Romania	60 (3.9)	468 (4.9)	40 (3.9)	443 (7.5)	56 (3.6)	465 (6.1)	44 (3.6)	449 (5.2)
Russian Federation	81 (2.2)	543 (4.5)	19 (2.2)	522 (7.1)	68 (3.2)	543 (4.8)	32 (3.2)	531 (5.3)
Saudi Arabia	37 (4.1)	403 (7.8)	63 (4.1)	391 (5.9)	28 (3.4)	400 (8.6)	72 (3.4)	393 (5.4)
Singapore	87 (2.0)	616 (3.6)	13 (2.0)	576 (12.1)	31 (2.5)	627 (6.4)	69 (2.5)	603 (4.5)
Slovenia	93 (1.3)	506 (2.4)	7 (1.3)	501 (9.0)	52 (2.5)	510 (3.0)	48 (2.5)	501 (3.2)
Sweden	r 93 (1.9)	487 (2.2)	7 (1.9)	474 (8.1)	r 44 (3.9)	498 (3.2)	56 (3.9)	477 (3.1)
Syrian Arab Republic	48 (4.7)	381 (7.1)	52 (4.7)	377 (5.8)	48 (4.4)	385 (6.9)	52 (4.4)	373 (5.8)
Thailand	79 (3.4)	434 (5.0)	21 (3.4)	401 (9.6)	56 (4.4)	430 (5.8)	44 (4.4)	422 (8.0)
Tunisia	51 (3.8)	437 (4.6)	49 (3.8)	412 (3.2)	46 (4.1)	425 (4.5)	54 (4.1)	425 (4.7)
Turkey	38 (3.1)	477 (8.4)	62 (3.1)	437 (4.3)	35 (3.1)	464 (7.4)	65 (3.1)	446 (4.8)
Ukraine	83 (2.6)	482 (4.5)	17 (2.6)	465 (9.1)	74 (3.5)	481 (4.4)	26 (3.5)	475 (7.1)
United Arab Emirates	50 (2.6)	472 (3.6)	50 (2.6)	439 (3.2)	38 (2.6)	474 (4.5)	62 (2.6)	444 (2.8)
United States	r 68 (2.6)	523 (4.2)	32 (2.6)	487 (4.2)	r 22 (2.5)	543 (6.9)	78 (2.5)	503 (3.3)
International Avg.	63 (0.5)	477 (0.8)	37 (0.5)	449 (1.2)	43 (0.6)	477 (1.0)	57 (0.6)	461 (0.9)

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A tilde (~) indicates insufficient data to report achievement.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 8.22: Instruction Limited by Students Suffering from Lack of Nutrition or Sleep (Continued)

Country	Students in Classrooms Where Teachers Report Instruction Is Limited by Students Suffering from Lack of Basic Nutrition				Students in Classrooms Where Teachers Report Instruction Is Limited by Students Suffering from Not Enough Sleep			
	Not At All		Some or A Lot		Not At All		Some or A Lot	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Ninth Grade Participants								
Botswana	55 (4.3)	397 (3.2)	45 (4.3)	394 (4.6)	34 (3.8)	404 (4.5)	66 (3.8)	392 (3.3)
Honduras	r 26 (3.8)	362 (12.6)	74 (3.8)	329 (4.5)	r 39 (4.8)	328 (7.0)	61 (4.8)	343 (5.7)
South Africa	37 (3.3)	379 (6.7)	63 (3.3)	336 (3.9)	41 (3.5)	350 (5.7)	59 (3.5)	353 (4.0)
Benchmarking Participants								
Alberta, Canada	58 (4.3)	512 (3.2)	42 (4.3)	495 (3.7)	13 (2.6)	519 (7.4)	87 (2.6)	503 (2.9)
Ontario, Canada	63 (4.2)	520 (3.4)	37 (4.2)	502 (4.1)	22 (3.1)	528 (5.6)	78 (3.1)	509 (3.0)
Quebec, Canada	76 (3.0)	539 (3.0)	24 (3.0)	513 (5.4)	29 (3.7)	543 (6.4)	71 (3.7)	529 (3.2)
Abu Dhabi, UAE	43 (4.4)	465 (8.1)	57 (4.4)	439 (5.0)	31 (4.5)	466 (11.4)	69 (4.5)	444 (4.7)
Dubai, UAE	63 (3.0)	498 (3.2)	37 (3.0)	440 (7.0)	51 (2.6)	494 (3.8)	49 (2.6)	458 (5.1)
Alabama, US	s 75 (6.4)	472 (10.7)	25 (6.4)	451 (10.2)	r 23 (5.6)	489 (19.7)	77 (5.6)	459 (7.4)
California, US	s 62 (5.9)	502 (6.9)	38 (5.9)	475 (10.8)	s 26 (6.4)	509 (10.3)	74 (6.4)	486 (8.8)
Colorado, US	r 59 (6.4)	531 (9.4)	41 (6.4)	495 (11.6)	r 10 (3.3)	541 (17.0)	90 (3.3)	514 (6.5)
Connecticut, US	r 75 (5.3)	542 (8.0)	25 (5.3)	471 (13.2)	r 33 (5.7)	545 (12.9)	67 (5.7)	514 (8.1)
Florida, US	r 69 (6.8)	537 (8.3)	31 (6.8)	476 (8.8)	r 22 (5.4)	548 (12.9)	78 (5.4)	510 (9.2)
Indiana, US	r 74 (4.6)	524 (6.8)	26 (4.6)	498 (10.2)	r 26 (4.9)	543 (10.0)	74 (4.9)	509 (6.6)
Massachusetts, US	r 83 (4.7)	567 (6.8)	17 (4.7)	531 (12.6)	r 41 (7.7)	580 (10.5)	59 (7.7)	547 (8.3)
Minnesota, US	r 65 (5.7)	560 (5.8)	35 (5.7)	523 (11.2)	r 23 (3.6)	554 (11.3)	77 (3.6)	546 (7.2)
North Carolina, US	r 80 (5.5)	541 (8.8)	20 (5.5)	534 (17.7)	r 32 (6.2)	565 (12.6)	68 (6.2)	526 (7.1)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 8.23: Instruction Limited by Disruptive or Uninterested Students

TIMSS 2011 4th Grade Mathematics

Reported by Teachers

Country	Students in Classrooms Where Teachers Report Instruction Is Limited by Disruptive Students					Students in Classrooms Where Teachers Report Instruction Is Limited by Uninterested Students				
	Some or Not At All			A Lot		Some or Not At All			A Lot	
	Percent of Students		Average Achievement	Percent of Students	Average Achievement	Percent of Students		Average Achievement	Percent of Students	Average Achievement
Armenia	95 (1.6)		453 (4.0)	5 (1.6)	442 (12.7)	88 (2.8)		454 (4.1)	12 (2.8)	442 (8.2)
Australia	r 86 (2.7)		523 (4.0)	14 (2.7)	494 (6.2)	r 94 (1.7)		521 (3.7)	6 (1.7)	487 (11.3)
Austria	89 (2.3)		510 (2.9)	11 (2.3)	496 (7.1)	93 (2.2)		510 (2.5)	7 (2.2)	491 (9.5)
Azerbaijan	99 (0.7)		464 (5.7)	1 (0.7)	~ ~	97 (1.0)		465 (5.7)	3 (1.0)	435 (18.1)
Bahrain	83 (3.8)		437 (4.2)	17 (3.8)	432 (7.7)	84 (3.4)		440 (4.2)	16 (3.4)	420 (6.3)
Belgium (Flemish)	92 (2.1)		551 (2.0)	8 (2.1)	532 (8.0)	97 (1.3)		550 (1.9)	3 (1.3)	514 (10.5)
Chile	72 (3.8)		471 (2.6)	28 (3.8)	441 (6.6)	82 (3.4)		465 (3.0)	18 (3.4)	451 (8.5)
Chinese Taipei	97 (1.6)		592 (2.0)	3 (1.6)	560 (15.3)	91 (2.3)		593 (1.9)	9 (2.3)	573 (10.0)
Croatia	93 (1.9)		490 (1.9)	7 (1.9)	494 (8.0)	95 (1.4)		491 (1.9)	5 (1.4)	477 (6.4)
Czech Republic	89 (2.4)		511 (2.4)	11 (2.4)	505 (10.8)	96 (1.5)		512 (2.2)	4 (1.5)	474 (25.9)
Denmark	93 (1.5)		541 (2.4)	7 (1.5)	522 (16.2)	95 (1.3)		541 (2.4)	5 (1.3)	515 (25.4)
England	93 (2.1)		547 (3.9)	7 (2.1)	508 (10.0)	95 (1.8)		546 (3.9)	5 (1.8)	512 (12.2)
Finland	90 (2.3)		547 (2.2)	10 (2.3)	539 (7.9)	97 (0.7)		546 (2.3)	3 (0.7)	552 (17.0)
Georgia	98 (1.1)		452 (3.8)	2 (1.1)	~ ~	93 (1.8)		452 (4.0)	7 (1.8)	436 (14.1)
Germany	91 (2.0)		530 (2.5)	9 (2.0)	511 (6.7)	96 (1.2)		528 (2.4)	4 (1.2)	526 (8.4)
Hong Kong SAR	95 (1.9)		603 (3.4)	5 (1.9)	579 (11.8)	91 (2.3)		605 (3.6)	9 (2.3)	572 (7.6)
Hungary	90 (2.0)		516 (3.8)	10 (2.0)	499 (11.9)	94 (1.4)		515 (3.7)	6 (1.4)	502 (16.0)
Iran, Islamic Rep. of	88 (2.4)		432 (3.9)	12 (2.4)	418 (11.4)	81 (3.2)		438 (4.1)	19 (3.2)	401 (8.4)
Ireland	90 (2.5)		529 (2.8)	10 (2.5)	517 (7.7)	96 (1.6)		528 (2.7)	4 (1.6)	517 (7.0)
Italy	78 (3.1)		510 (3.3)	22 (3.1)	505 (6.6)	87 (2.8)		510 (3.0)	13 (2.8)	500 (8.1)
Japan	96 (1.7)		585 (1.7)	4 (1.7)	597 (8.4)	98 (1.1)		585 (1.7)	2 (1.1)	~ ~
Kazakhstan	99 (0.7)		502 (4.5)	1 (0.7)	~ ~	97 (1.4)		502 (4.5)	3 (1.4)	505 (21.7)
Korea, Rep. of	63 (3.8)		606 (2.6)	37 (3.8)	602 (3.0)	81 (3.5)		606 (2.3)	19 (3.5)	601 (3.9)
Kuwait	80 (3.2)		345 (3.8)	20 (3.2)	327 (8.5)	83 (3.0)		343 (4.0)	17 (3.0)	334 (7.3)
Lithuania	80 (2.5)		533 (2.8)	20 (2.5)	535 (6.2)	84 (2.7)		535 (2.8)	16 (2.7)	524 (7.6)
Malta	83 (0.1)		498 (1.5)	17 (0.1)	486 (4.0)	89 (0.1)		498 (1.5)	11 (0.1)	481 (4.9)
Morocco	75 (4.4)		346 (5.1)	25 (4.4)	314 (7.6)	62 (4.0)		352 (5.7)	38 (4.0)	314 (6.5)
Netherlands	r 90 (2.8)		539 (2.1)	10 (2.8)	535 (4.6)	r 98 (0.8)		539 (2.1)	2 (0.8)	~ ~
New Zealand	89 (1.6)		491 (2.7)	11 (1.6)	445 (6.0)	97 (0.9)		488 (2.6)	3 (0.9)	445 (14.9)
Northern Ireland	r 96 (1.7)		564 (3.4)	4 (1.7)	539 (29.7)	r 98 (1.2)		563 (3.5)	2 (1.2)	~ ~
Norway	92 (2.0)		496 (2.9)	8 (2.0)	488 (12.4)	97 (1.4)		495 (2.8)	3 (1.4)	512 (38.0)
Oman	75 (2.8)		391 (3.2)	25 (2.8)	370 (5.4)	73 (3.1)		391 (3.2)	27 (3.1)	372 (5.3)
Poland	85 (2.6)		481 (2.4)	15 (2.6)	482 (6.3)	93 (1.7)		482 (2.2)	7 (1.7)	476 (8.6)
Portugal	88 (2.4)		533 (3.9)	12 (2.4)	530 (11.1)	85 (2.9)		533 (4.1)	15 (2.9)	531 (9.2)
Qatar	76 (3.5)		425 (4.8)	24 (3.5)	376 (9.0)	77 (3.2)		423 (4.4)	23 (3.2)	378 (8.7)
Romania	98 (0.8)		481 (6.0)	2 (0.8)	~ ~	93 (2.0)		484 (6.1)	7 (2.0)	445 (21.7)
Russian Federation	94 (1.8)		542 (4.0)	6 (1.8)	540 (11.6)	95 (1.8)		543 (3.8)	5 (1.8)	521 (9.1)
Saudi Arabia	91 (2.4)		411 (4.6)	9 (2.4)	400 (30.7)	79 (3.3)		415 (6.1)	21 (3.3)	394 (12.1)
Serbia	90 (2.2)		517 (3.0)	10 (2.2)	519 (6.4)	87 (2.6)		516 (3.1)	13 (2.6)	520 (9.4)
Singapore	87 (1.8)		607 (3.4)	13 (1.8)	595 (8.3)	90 (1.9)		608 (3.1)	10 (1.9)	581 (12.8)
Slovak Republic	95 (1.1)		507 (4.0)	5 (1.1)	491 (10.9)	93 (1.7)		509 (3.4)	7 (1.7)	478 (15.8)
Slovenia	66 (3.6)		516 (2.7)	34 (3.6)	507 (3.1)	84 (2.4)		514 (2.5)	16 (2.4)	507 (3.1)
Spain	87 (2.6)		487 (2.9)	13 (2.6)	453 (9.5)	83 (3.0)		489 (2.9)	17 (3.0)	453 (7.6)
Sweden	r 91 (2.5)		506 (2.6)	9 (2.5)	498 (11.8)	r 97 (1.4)		506 (2.5)	3 (1.4)	487 (11.1)
Thailand	94 (2.4)		460 (5.3)	6 (2.4)	435 (14.7)	89 (3.0)		464 (4.3)	11 (3.0)	416 (16.8)
Tunisia	73 (4.0)		362 (4.7)	27 (4.0)	354 (6.5)	73 (4.0)		364 (4.6)	27 (4.0)	347 (8.7)
Turkey	84 (2.4)		470 (5.4)	16 (2.4)	466 (8.7)	67 (3.1)		483 (4.5)	33 (3.1)	441 (9.8)
United Arab Emirates	87 (1.8)		439 (2.6)	13 (1.8)	407 (7.0)	90 (1.6)		440 (2.4)	10 (1.6)	391 (7.9)
United States	r 85 (1.7)		546 (2.3)	15 (1.7)	523 (5.1)	r 91 (1.0)		544 (2.3)	9 (1.0)	518 (6.3)
Yemen	84 (3.1)		249 (6.9)	16 (3.1)	237 (11.5)	69 (4.5)		252 (7.5)	31 (4.5)	236 (10.6)
International Avg.	87 (0.3)		493 (0.5)	13 (0.3)	479 (1.6)	89 (0.3)		494 (0.5)	11 (0.3)	468 (1.9)

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A tilde (~) indicates insufficient data to report achievement.
An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 8.23: Instruction Limited by Disruptive or Uninterested Students (Continued)

TIMSS 2011 Mathematics 4th Grade

Country	Students in Classrooms Where Teachers Report Instruction Is Limited by Disruptive Students				Students in Classrooms Where Teachers Report Instruction Is Limited by Uninterested Students			
	Some or Not At All		A Lot		Some or Not At All		A Lot	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Sixth Grade Participants								
Botswana	87 (2.7)	421 (4.7)	13 (2.7)	420 (12.0)	81 (3.5)	426 (4.9)	19 (3.5)	400 (8.9)
Honduras	95 (1.3)	396 (6.0)	5 (1.3)	395 (12.5)	89 (2.6)	397 (6.3)	11 (2.6)	391 (11.1)
Yemen	81 (3.5)	343 (6.7)	19 (3.5)	368 (9.2)	68 (3.6)	352 (7.4)	32 (3.6)	339 (8.8)
Benchmarking Participants								
Alberta, Canada r	84 (3.1)	510 (3.0)	16 (3.1)	486 (4.1)	r 94 (1.9)	508 (2.8)	6 (1.9)	474 (7.8)
Ontario, Canada	81 (2.6)	520 (3.5)	19 (2.6)	515 (4.9)	93 (2.0)	521 (3.1)	7 (2.0)	493 (8.7)
Quebec, Canada	77 (3.8)	534 (2.7)	23 (3.8)	528 (4.7)	90 (2.8)	534 (2.6)	10 (2.8)	524 (5.7)
Abu Dhabi, UAE	86 (2.9)	421 (5.5)	14 (2.9)	399 (12.0)	90 (3.0)	424 (5.1)	10 (3.0)	365 (9.5)
Dubai, UAE r	91 (1.6)	476 (2.9)	9 (1.6)	439 (7.4)	r 95 (1.5)	477 (2.7)	5 (1.5)	395 (13.8)
Florida, US r	89 (3.6)	548 (3.8)	11 (3.6)	519 (13.8)	r 91 (2.5)	546 (3.9)	9 (2.5)	526 (13.3)
North Carolina, US	85 (4.3)	557 (4.0)	15 (4.3)	536 (10.7)	84 (2.7)	555 (4.8)	16 (2.7)	545 (8.2)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 8.24: Instruction Limited by Disruptive or Uninterested Students

TIMSS 2011 8th Grade Mathematics

Reported by Teachers

Country	Students in Classrooms Where Teachers Report Instruction Is Limited by Disruptive Students					Students in Classrooms Where Teachers Report Instruction Is Limited by Uninterested Students				
	Some or Not At All			A Lot		Some or Not At All			A Lot	
		Percent of Students	Average Achievement	Percent of Students	Average Achievement		Percent of Students	Average Achievement	Percent of Students	Average Achievement
Armenia		90 (2.4)	467 (3.1)	10 (2.4)	468 (9.2)		76 (3.1)	471 (3.4)	24 (3.1)	450 (6.7)
Australia	r	82 (2.5)	520 (6.2)	18 (2.5)	457 (10.6)	r	87 (2.4)	518 (6.1)	13 (2.4)	441 (9.8)
Bahrain		76 (2.8)	420 (2.5)	24 (2.8)	377 (3.6)		62 (3.2)	424 (3.2)	38 (3.2)	387 (3.0)
Chile		67 (3.7)	427 (3.8)	33 (3.7)	401 (7.0)		64 (3.9)	430 (4.5)	36 (3.9)	396 (4.7)
Chinese Taipei		74 (3.4)	611 (3.9)	26 (3.4)	604 (7.5)		52 (3.3)	622 (3.9)	48 (3.3)	596 (5.7)
England		83 (3.1)	518 (6.1)	17 (3.1)	448 (12.8)		88 (2.6)	516 (6.0)	12 (2.6)	436 (13.1)
Finland		85 (2.4)	517 (2.6)	15 (2.4)	500 (6.3)		82 (2.7)	519 (2.7)	18 (2.7)	495 (5.0)
Georgia		89 (2.0)	431 (4.2)	11 (2.0)	428 (9.6)		78 (2.8)	437 (4.2)	22 (2.8)	405 (8.7)
Ghana		95 (1.9)	331 (4.4)	5 (1.9)	314 (13.8)		93 (2.1)	334 (4.4)	7 (2.1)	288 (9.8)
Hong Kong SAR		95 (2.0)	591 (3.7)	5 (2.0)	477 (28.3)		86 (2.8)	599 (4.0)	14 (2.8)	501 (13.5)
Hungary		86 (2.1)	508 (3.4)	14 (2.1)	482 (9.5)		82 (2.5)	510 (3.5)	18 (2.5)	478 (8.7)
Indonesia		98 (1.3)	385 (4.4)	2 (1.3)	~ ~		87 (3.3)	388 (4.2)	13 (3.3)	373 (16.8)
Iran, Islamic Rep. of		86 (2.4)	415 (4.5)	14 (2.4)	414 (12.7)		68 (3.1)	418 (4.7)	32 (3.1)	407 (8.0)
Israel		83 (2.2)	529 (4.5)	17 (2.2)	476 (9.1)		84 (2.2)	529 (4.2)	16 (2.2)	469 (9.4)
Italy		80 (3.2)	504 (2.7)	20 (3.2)	480 (8.5)		70 (3.7)	507 (2.8)	30 (3.7)	481 (5.5)
Japan		99 (0.7)	570 (2.7)	1 (0.0)	~ ~		96 (1.7)	571 (2.7)	4 (1.7)	544 (11.1)
Jordan		76 (3.4)	406 (4.0)	24 (3.4)	405 (8.8)		64 (3.8)	414 (4.8)	36 (3.8)	391 (6.6)
Kazakhstan		96 (1.6)	489 (4.2)	4 (1.6)	457 (26.0)		94 (1.6)	487 (4.3)	6 (1.6)	492 (14.1)
Korea, Rep. of		60 (3.1)	618 (4.1)	40 (3.1)	604 (4.5)		71 (3.1)	620 (3.7)	29 (3.1)	594 (5.1)
Lebanon		90 (2.6)	449 (3.9)	10 (2.6)	453 (12.6)		85 (2.9)	451 (4.1)	15 (2.9)	445 (13.0)
Lithuania		76 (3.1)	508 (3.1)	24 (3.1)	486 (4.6)		77 (2.7)	508 (3.3)	23 (2.7)	486 (4.9)
Macedonia, Rep. of	r	89 (2.5)	430 (6.3)	11 (2.5)	393 (17.9)	r	80 (3.4)	431 (6.9)	20 (3.4)	405 (14.0)
Malaysia		96 (1.6)	442 (5.6)	4 (1.6)	407 (17.4)		84 (3.0)	453 (5.6)	16 (3.0)	372 (9.3)
Morocco		79 (2.6)	374 (2.4)	21 (2.6)	362 (4.3)		49 (3.1)	383 (3.8)	51 (3.1)	360 (2.7)
New Zealand		81 (2.4)	495 (5.6)	19 (2.4)	460 (9.1)		86 (1.8)	493 (5.6)	14 (1.8)	462 (12.9)
Norway		94 (2.0)	476 (2.4)	6 (2.0)	461 (11.0)		97 (1.9)	476 (2.5)	3 (1.9)	448 (25.8)
Oman		86 (2.5)	370 (3.5)	14 (2.5)	340 (7.5)		59 (3.2)	376 (4.5)	41 (3.2)	351 (4.7)
Palestinian Nat'l Auth.		61 (4.3)	406 (5.0)	39 (4.3)	402 (6.0)		55 (4.4)	403 (4.5)	45 (4.4)	406 (6.5)
Qatar		78 (2.7)	420 (4.9)	22 (2.7)	368 (7.0)		76 (2.8)	425 (5.1)	24 (2.8)	359 (6.3)
Romania		95 (1.7)	457 (3.9)	5 (1.7)	430 (26.9)		84 (3.0)	464 (4.4)	16 (3.0)	425 (9.9)
Russian Federation		86 (1.9)	545 (3.7)	14 (1.9)	503 (7.9)		81 (2.9)	546 (3.5)	19 (2.9)	511 (7.1)
Saudi Arabia		82 (3.1)	401 (5.1)	18 (3.1)	370 (7.4)		74 (3.4)	400 (5.3)	26 (3.4)	383 (8.7)
Singapore		88 (1.9)	617 (3.7)	12 (1.9)	568 (13.0)		87 (1.9)	618 (3.6)	13 (1.9)	561 (14.2)
Slovenia		78 (2.2)	510 (2.2)	22 (2.2)	489 (4.9)		80 (2.4)	510 (2.0)	20 (2.4)	486 (4.9)
Sweden	r	91 (1.9)	488 (2.3)	9 (1.9)	462 (6.0)	r	92 (1.7)	488 (2.1)	8 (1.7)	459 (6.4)
Syrian Arab Republic		73 (4.0)	384 (4.7)	27 (4.0)	361 (9.4)		61 (4.7)	388 (5.5)	39 (4.7)	363 (8.2)
Thailand		91 (2.3)	428 (4.5)	9 (2.3)	417 (11.3)		81 (3.0)	429 (5.3)	19 (3.0)	415 (8.6)
Tunisia		75 (3.1)	425 (3.4)	25 (3.1)	425 (4.7)		59 (4.0)	429 (3.9)	41 (4.0)	419 (3.8)
Turkey		66 (3.4)	460 (4.9)	34 (3.4)	438 (6.8)		44 (3.4)	482 (6.8)	56 (3.4)	429 (5.1)
Ukraine		77 (3.5)	486 (4.6)	23 (3.5)	456 (8.2)		66 (3.5)	488 (5.4)	34 (3.5)	462 (5.8)
United Arab Emirates		90 (1.5)	459 (2.3)	10 (1.5)	424 (7.4)		85 (1.9)	461 (2.4)	15 (1.9)	423 (6.6)
United States	r	86 (1.8)	518 (3.4)	14 (1.8)	472 (5.9)	r	81 (2.3)	518 (3.6)	19 (2.3)	485 (5.5)
International Avg.		83 (0.4)	472 (0.6)	17 (0.4)	444 (1.8)		76 (0.5)	475 (0.7)	24 (0.5)	441 (1.5)

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A tilde (~) indicates insufficient data to report achievement.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 8.24: Instruction Limited by Disruptive or Uninterested Students (Continued)

TIMSS 2011 Mathematics 8th Grade

Country		Students in Classrooms Where Teachers Report Instruction Is Limited by Disruptive Students				Students in Classrooms Where Teachers Report Instruction Is Limited by Uninterested Students			
		Some or Not At All		A Lot		Some or Not At All		A Lot	
		Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Ninth Grade Participants									
Botswana		71 (4.0)	397 (2.7)	29 (4.0)	396 (6.4)	52 (4.8)	403 (3.7)	48 (4.8)	390 (3.9)
Honduras	r	77 (4.4)	336 (5.5)	23 (4.4)	343 (9.3)	r 69 (3.8)	339 (6.1)	31 (3.8)	335 (6.5)
South Africa		79 (3.2)	356 (3.6)	21 (3.2)	342 (6.0)	74 (3.9)	358 (3.9)	26 (3.9)	337 (5.6)
Benchmarking Participants									
Alberta, Canada		85 (3.0)	507 (2.8)	15 (3.0)	491 (5.5)	91 (2.5)	507 (2.7)	9 (2.5)	487 (6.8)
Ontario, Canada		90 (2.5)	515 (2.7)	10 (2.5)	494 (6.7)	90 (2.2)	514 (2.6)	10 (2.2)	508 (9.0)
Quebec, Canada		75 (3.2)	539 (3.1)	25 (3.2)	515 (4.5)	79 (3.2)	538 (2.8)	21 (3.2)	514 (4.4)
Abu Dhabi, UAE		89 (2.7)	452 (4.0)	11 (2.7)	428 (14.3)	82 (3.7)	453 (4.1)	18 (3.7)	435 (12.1)
Dubai, UAE		93 (1.4)	481 (2.8)	7 (1.4)	424 (19.5)	92 (1.2)	482 (2.7)	8 (1.2)	417 (9.1)
Alabama, US	r	79 (4.2)	478 (8.8)	21 (4.2)	424 (9.6)	r 70 (5.4)	474 (11.0)	30 (5.4)	450 (8.8)
California, US	s	84 (3.7)	501 (6.8)	16 (3.7)	443 (13.6)	s 81 (4.4)	502 (6.8)	19 (4.4)	449 (12.7)
Colorado, US	r	84 (4.2)	526 (7.1)	16 (4.2)	469 (19.7)	r 82 (5.1)	527 (6.6)	18 (5.1)	470 (18.0)
Connecticut, US	r	84 (4.1)	535 (6.3)	16 (4.1)	467 (12.4)	r 86 (4.1)	534 (6.3)	14 (4.1)	464 (12.5)
Florida, US	r	85 (3.6)	525 (7.8)	15 (3.6)	480 (10.7)	r 82 (5.0)	526 (8.7)	18 (5.0)	484 (11.5)
Indiana, US	r	91 (2.9)	519 (6.2)	9 (2.9)	501 (22.1)	r 80 (5.1)	521 (6.4)	20 (5.1)	501 (15.1)
Massachusetts, US	r	92 (3.5)	563 (6.7)	8 (3.5)	529 (25.7)	r 89 (3.3)	564 (6.8)	11 (3.3)	529 (15.8)
Minnesota, US	r	80 (3.2)	557 (6.1)	20 (3.2)	510 (15.2)	r 85 (3.9)	555 (5.7)	15 (3.9)	505 (18.5)
North Carolina, US	r	91 (3.2)	541 (7.9)	9 (3.2)	509 (15.5)	r 75 (5.6)	547 (9.8)	25 (5.6)	513 (11.2)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Instruction Limited by Disruptive or Uninterested Students

The importance of classroom management and maintaining a positive and productive classroom environment is widely recognized as central to high-quality teaching (Bill & Melinda Gates Foundation, 2010). Yet, even the most experienced and effective teachers can encounter discipline problems.

Exhibit 8.23 presents teachers' reports about the extent to which their fourth grade classroom instruction in mathematics was limited by disruptive or uninterested students. As good news, internationally, on average, teachers reported their instruction was rarely limited by either disruptive or bored students, with 87 to 89 percent of the fourth grade students in classrooms with some or no problems. However, the 11 to 13 percent of students in classrooms with a lot of student behavior problems did have lower average mathematics achievement (from 14–26 points). Across the fourth grade, sixth grade, and benchmarking participants there was some variation in teachers' reports. In general, however, teachers reported that fourth grade students around the world appear relatively well behaved and attentive during their mathematics lessons.

Exhibit 8.24 presents teachers' reports about the extent to which their eighth grade classroom instruction in mathematics was limited by disruptive or uninterested students. Internationally, on average, teachers reported their instruction was limited "some or not at all" by disruptive students for 83 percent of the students and by bored students for 76 percent of the students. Although most eighth grade students were in mathematics classrooms with attentive students, the 17 to 24 percent of students in classrooms with "a lot" of student behavior problems had lower average mathematics achievement (from 28–34 points). Across the eighth grade, ninth grade, and benchmarking participants there was some variation in teachers' reports. Compared to the fourth grade, however, boredom appears to be an emerging problem in mathematics classes at the eighth grade. It is difficult to know whether students are bored because they cannot do the mathematics, or whether they just find mathematics boring.

Classroom Resources and Activities for Teaching Mathematics

Resources Teachers Use for Teaching Mathematics

Exhibit 8.25 contains teachers' reports about the classroom materials used for teaching mathematics at the fourth grade. On average, internationally, textbooks were used most often as the basis for mathematics instruction, for 75 percent of the fourth grade students, and workbooks or worksheets were used the next most often, for 46 percent of the students. Concrete objects to help students understand quantities or procedures (often called manipulables) were used as the basis of instruction for 37 percent of the fourth grade students, and relying on computer software was relatively rare, used for only 9 percent of the students, on average. Teachers reported that all of the materials TIMSS asked about were used to some extent as a supplementary resources for mathematics instruction at the fourth grade, with concrete objects or materials the most popular, used with 62 percent of the students, on average, followed by workbooks or worksheets used with 53 percent of the students. Teachers reported using computer software as a supplementary resource for 56 percent of the fourth grade students, on average.

As shown in Exhibit 8.26, textbooks also were the most frequent basis of mathematics instruction at the eighth grade, used with 77 percent of the students internationally, on average. However, in contrast to the fourth grade, workbooks or worksheets were much less frequently reported as a basis for instruction, used with approximately one-third of eighth grade students. As would be anticipated, concrete objects were less frequently used than at the fourth grade (23% of students on average). Computer software was not used with many students, on average, only 7 percent. All of the following materials except textbooks were popular as supplementary instructional resources at the eighth grade: workbooks or worksheets with 62 percent of students, concrete objects with 71 percent, and computer software with 55 percent.

Exhibit 8.25: Resources Teachers Use for Teaching Mathematics

TIMSS 2011 Mathematics 4th Grade

Reported by Teachers

Country	Percent of Students Whose Teachers Use							
	Textbooks		Workbooks or Worksheets		Concrete Objects or Materials that Help Students Understand Quantities or Procedures		Computer Software for Mathematics Instruction	
	As Basis for Instruction	As a Supplement	As Basis for Instruction	As a Supplement	As Basis for Instruction	As a Supplement	As Basis for Instruction	As a Supplement
Armenia	98 (0.9)	2 (0.9)	15 (2.9)	78 (3.3)	22 (2.7)	78 (2.7)	4 (1.7)	47 (3.8)
Australia	r 25 (3.5)	46 (3.8)	s 11 (1.9)	87 (2.2)	r 56 (4.0)	44 (4.0)	r 12 (2.4)	77 (3.3)
Austria	90 (2.2)	9 (2.2)	26 (2.6)	73 (2.7)	33 (3.3)	67 (3.3)	2 (1.1)	59 (3.6)
Azerbaijan	98 (0.9)	2 (0.9)	54 (3.4)	46 (3.4)	18 (2.9)	80 (3.0)	4 (1.5)	37 (3.8)
Bahrain	76 (5.0)	23 (4.9)	53 (3.8)	47 (3.8)	40 (5.3)	57 (5.1)	17 (3.3)	61 (5.3)
Belgium (Flemish)	39 (3.1)	35 (3.6)	93 (1.8)	7 (1.8)	29 (3.6)	71 (3.6)	2 (1.0)	71 (3.6)
Chile	r 19 (3.5)	81 (3.5)	r 40 (4.5)	57 (4.5)	r 47 (4.0)	53 (4.0)	r 5 (1.6)	73 (4.0)
Chinese Taipei	99 (0.7)	1 (0.0)	56 (4.2)	44 (4.2)	16 (2.8)	82 (3.1)	17 (3.4)	62 (4.3)
Croatia	88 (2.3)	12 (2.3)	37 (3.6)	63 (3.6)	14 (2.1)	86 (2.1)	1 (0.5)	24 (2.9)
Czech Republic	77 (3.4)	19 (3.3)	63 (3.7)	35 (3.6)	26 (3.7)	73 (3.7)	4 (1.3)	64 (4.0)
Denmark	r 90 (2.6)	10 (2.6)	r 50 (4.1)	46 (4.0)	r 26 (3.8)	74 (3.8)	r 9 (2.5)	84 (3.0)
England	10 (2.4)	64 (4.0)	11 (2.6)	78 (3.8)	39 (4.5)	59 (4.3)	24 (3.8)	74 (3.7)
Finland	95 (1.7)	3 (1.2)	37 (3.6)	61 (3.7)	15 (2.0)	83 (2.2)	5 (2.0)	69 (3.6)
Georgia	99 (0.6)	1 (0.6)	68 (3.6)	32 (3.6)	15 (2.5)	85 (2.5)	2 (1.1)	36 (3.7)
Germany	86 (2.3)	11 (2.2)	40 (3.5)	59 (3.6)	26 (3.2)	74 (3.2)	2 (0.9)	58 (3.4)
Hong Kong SAR	88 (2.8)	11 (2.9)	44 (3.9)	56 (3.9)	26 (3.7)	74 (3.7)	34 (4.5)	61 (4.6)
Hungary	88 (2.3)	11 (2.2)	69 (3.5)	31 (3.5)	43 (3.5)	57 (3.5)	4 (1.3)	31 (3.7)
Iran, Islamic Rep. of	91 (2.1)	9 (2.1)	13 (2.5)	81 (2.8)	45 (3.5)	54 (3.5)	2 (1.2)	12 (2.5)
Ireland	71 (3.5)	29 (3.4)	16 (3.2)	82 (3.1)	43 (3.7)	56 (3.8)	11 (2.2)	68 (3.3)
Italy	45 (3.0)	54 (3.2)	25 (3.5)	74 (3.4)	45 (3.4)	54 (3.5)	0 (0.4)	43 (3.4)
Japan	92 (2.2)	8 (2.2)	9 (2.4)	84 (3.0)	23 (3.4)	77 (3.4)	1 (0.9)	35 (3.7)
Kazakhstan	88 (2.9)	12 (2.9)	10 (2.4)	90 (2.4)	24 (3.7)	76 (3.7)	7 (1.9)	75 (3.3)
Korea, Rep. of	99 (1.0)	1 (0.0)	71 (3.4)	28 (3.5)	16 (3.0)	81 (3.1)	25 (3.7)	63 (4.5)
Kuwait	96 (1.5)	3 (1.4)	79 (3.2)	21 (3.2)	64 (3.6)	35 (3.6)	9 (2.4)	65 (3.9)
Lithuania	94 (1.8)	6 (1.8)	79 (3.1)	21 (3.1)	21 (2.9)	79 (2.9)	2 (1.1)	65 (3.2)
Malta	91 (0.1)	9 (0.1)	42 (0.1)	58 (0.1)	44 (0.1)	56 (0.1)	27 (0.1)	45 (0.1)
Morocco	r 77 (3.0)	23 (3.0)	r 75 (3.3)	24 (3.2)	r 78 (3.1)	21 (3.0)	r 6 (1.9)	10 (2.1)
Netherlands	r 93 (2.2)	4 (1.8)	r 62 (4.3)	37 (4.5)	r 2 (1.1)	96 (2.0)	r 3 (1.5)	88 (3.0)
New Zealand	7 (1.2)	75 (2.4)	8 (1.2)	90 (1.4)	68 (2.8)	32 (2.8)	9 (2.0)	80 (2.6)
Northern Ireland	r 43 (4.5)	56 (4.5)	r 24 (4.1)	76 (4.1)	r 37 (3.9)	63 (3.9)	r 13 (3.1)	82 (3.3)
Norway	97 (1.4)	3 (1.4)	34 (4.4)	66 (4.4)	34 (4.5)	65 (4.5)	14 (3.0)	75 (4.1)
Oman	49 (3.7)	51 (3.7)	61 (2.9)	38 (2.9)	55 (3.2)	44 (3.3)	5 (1.4)	74 (2.6)
Poland	78 (3.2)	14 (2.6)	66 (3.5)	34 (3.5)	48 (4.2)	52 (4.2)	0 (0.0)	44 (4.0)
Portugal	56 (4.9)	40 (4.9)	47 (5.1)	53 (5.1)	70 (4.0)	30 (4.0)	9 (4.6)	62 (4.1)
Qatar	70 (3.5)	27 (3.6)	56 (3.0)	43 (3.0)	54 (5.0)	46 (5.0)	29 (3.0)	53 (3.6)
Romania	90 (2.5)	10 (2.5)	40 (4.3)	60 (4.3)	48 (3.9)	51 (4.0)	5 (1.9)	45 (4.0)
Russian Federation	95 (1.7)	5 (1.6)	29 (3.9)	66 (4.2)	16 (3.3)	81 (3.5)	1 (0.7)	46 (2.8)
Saudi Arabia	93 (3.0)	7 (3.0)	62 (3.8)	38 (3.8)	57 (4.3)	42 (4.3)	30 (3.3)	51 (4.0)
Serbia	73 (3.1)	27 (3.1)	20 (3.5)	78 (3.6)	28 (3.2)	72 (3.2)	1 (0.7)	25 (3.2)
Singapore	70 (2.0)	23 (1.5)	71 (2.4)	29 (2.4)	34 (2.6)	66 (2.5)	16 (2.1)	80 (2.2)
Slovak Republic	85 (2.4)	15 (2.4)	64 (3.0)	35 (3.0)	10 (1.4)	89 (1.5)	1 (0.4)	61 (3.5)
Slovenia	76 (3.1)	15 (2.7)	79 (3.5)	21 (3.5)	49 (3.8)	51 (3.8)	2 (0.7)	70 (3.7)
Spain	77 (3.2)	20 (2.8)	40 (4.1)	59 (4.0)	20 (3.4)	79 (3.5)	2 (1.2)	64 (3.5)
Sweden	r 89 (2.8)	10 (2.6)	r 18 (3.2)	77 (3.2)	r 25 (3.6)	75 (3.6)	r 5 (2.0)	61 (4.3)
Thailand	81 (2.9)	19 (2.9)	53 (4.3)	47 (4.4)	37 (4.9)	61 (4.7)	4 (1.6)	50 (4.1)
Tunisia	44 (3.8)	56 (3.8)	68 (3.6)	31 (3.6)	83 (3.0)	17 (3.0)	5 (1.6)	26 (3.6)
Turkey	91 (1.7)	9 (1.7)	44 (3.1)	56 (3.1)	25 (2.8)	73 (3.0)	17 (2.8)	60 (3.0)
United Arab Emirates	80 (1.8)	18 (1.7)	50 (2.1)	48 (2.1)	55 (2.1)	42 (2.1)	18 (1.8)	53 (2.6)
United States	r 45 (2.3)	43 (2.1)	r 36 (3.0)	61 (2.9)	r 43 (2.2)	55 (2.1)	r 16 (1.4)	68 (2.3)
Yemen	85 (3.2)	14 (3.1)	61 (4.1)	39 (4.1)	34 (4.4)	55 (4.6)	3 (1.7)	4 (2.0)
International Avg.	75 (0.4)	21 (0.4)	46 (0.5)	53 (0.5)	37 (0.5)	62 (0.5)	9 (0.3)	56 (0.5)

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 8.25: Resources Teachers Use for Teaching Mathematics (Continued)

TIMSS 2011 Mathematics 4th Grade

Country	Percent of Students Whose Teachers Use							
	Textbooks		Workbooks or Worksheets		Concrete Objects or Materials that Help Students Understand Quantities or Procedures		Computer Software for Mathematics Instruction	
	As Basis for Instruction	As a Supplement	As Basis for Instruction	As a Supplement	As Basis for Instruction	As a Supplement	As Basis for Instruction	As a Supplement
Sixth Grade Participants								
Botswana	75 (4.3)	25 (4.3)	r 20 (3.7)	41 (4.9)	44 (4.5)	53 (4.5)	r 0 (0.0)	7 (2.3)
Honduras	88 (3.2)	11 (3.1)	42 (4.5)	54 (4.6)	53 (4.4)	45 (4.3)	5 (1.9)	16 (3.3)
Yemen	86 (3.2)	12 (2.9)	53 (4.5)	41 (4.5)	39 (4.6)	50 (4.6)	1 (0.9)	5 (2.1)
Benchmarking Participants								
Alberta, Canada	r 36 (4.0)	57 (4.0)	r 20 (3.5)	71 (4.0)	r 60 (4.5)	40 (4.5)	r 9 (2.4)	80 (3.7)
Ontario, Canada	49 (3.7)	44 (3.9)	20 (2.8)	78 (3.0)	55 (3.6)	45 (3.6)	4 (1.0)	65 (3.8)
Quebec, Canada	55 (4.6)	35 (4.6)	48 (4.7)	51 (4.5)	28 (4.1)	71 (4.2)	3 (1.3)	36 (4.2)
Abu Dhabi, UAE	82 (3.4)	16 (3.0)	52 (4.0)	46 (4.0)	57 (4.1)	39 (4.0)	17 (2.8)	54 (4.4)
Dubai, UAE	r 61 (2.4)	36 (2.5)	37 (4.0)	61 (4.0)	53 (2.6)	45 (2.9)	29 (3.7)	56 (3.8)
Florida, US	r 74 (4.6)	23 (4.5)	r 35 (4.6)	59 (4.5)	r 52 (5.4)	47 (5.6)	r 35 (4.7)	59 (5.5)
North Carolina, US	r 40 (7.8)	51 (8.1)	16 (5.4)	84 (5.4)	44 (6.4)	56 (6.4)	25 (5.8)	72 (6.2)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 8.26: Resources Teachers Use for Teaching Mathematics

TIMSS 2011 Mathematics 8th Grade

Reported by Teachers

Country	Percent of Students Whose Teachers Use							
	Textbooks		Workbooks or Worksheets		Concrete Objects or Materials that Help Students Understand Quantities or Procedures		Computer Software for Mathematics Instruction	
	As Basis for Instruction	As a Supplement	As Basis for Instruction	As a Supplement	As Basis for Instruction	As a Supplement	As Basis for Instruction	As a Supplement
Armenia	97 (1.4)	2 (1.1)	22 (2.9)	76 (2.9)	5 (1.8)	95 (1.8)	2 (1.0)	73 (3.2)
Australia	r 56 (4.0)	41 (3.9)	r 20 (3.5)	77 (3.6)	r 13 (2.7)	78 (3.4)	r 9 (2.5)	78 (3.3)
Bahrain	85 (2.1)	15 (2.1)	40 (3.7)	60 (3.7)	26 (3.4)	66 (4.0)	7 (1.8)	66 (2.7)
Chile	23 (3.2)	75 (3.3)	37 (4.0)	61 (4.0)	26 (3.7)	68 (4.0)	4 (1.6)	68 (3.8)
Chinese Taipei	92 (1.9)	7 (1.9)	48 (4.1)	50 (4.1)	6 (1.6)	90 (2.3)	1 (0.7)	52 (4.0)
England	29 (3.9)	57 (4.4)	21 (3.5)	74 (4.2)	8 (2.3)	75 (3.5)	21 (3.7)	76 (3.9)
Finland	88 (2.3)	12 (2.3)	26 (3.2)	64 (3.5)	9 (2.3)	83 (2.8)	1 (0.6)	53 (3.6)
Georgia	94 (1.8)	6 (1.8)	69 (3.5)	30 (3.5)	12 (2.6)	87 (2.7)	3 (1.3)	58 (3.4)
Ghana	56 (3.7)	42 (3.7)	27 (3.8)	51 (4.3)	50 (4.2)	42 (4.4)	1 (0.6)	7 (2.2)
Hong Kong SAR	88 (2.9)	11 (2.7)	34 (4.2)	65 (4.3)	8 (2.2)	86 (2.9)	3 (1.5)	87 (3.0)
Hungary	72 (3.2)	28 (3.3)	22 (2.9)	61 (3.6)	26 (3.2)	73 (3.2)	2 (1.1)	44 (3.4)
Indonesia	85 (3.6)	14 (3.7)	14 (2.6)	82 (3.5)	34 (4.5)	62 (4.5)	5 (2.3)	36 (4.5)
Iran, Islamic Rep. of	95 (1.5)	5 (1.4)	8 (1.5)	82 (2.5)	29 (3.3)	59 (3.3)	4 (1.3)	24 (3.1)
Israel	97 (1.0)	3 (1.0)	32 (2.8)	66 (2.9)	22 (3.0)	59 (3.0)	5 (1.9)	35 (3.2)
Italy	69 (3.3)	31 (3.3)	38 (4.0)	62 (4.0)	13 (2.5)	84 (2.7)	3 (1.4)	47 (3.9)
Japan	83 (2.8)	15 (2.7)	22 (3.4)	75 (3.5)	10 (2.1)	80 (3.2)	0 (0.0)	27 (3.6)
Jordan	91 (2.4)	9 (2.4)	42 (4.1)	57 (4.1)	30 (3.9)	64 (4.1)	7 (1.9)	68 (3.3)
Kazakhstan	85 (2.9)	15 (2.9)	13 (2.6)	85 (2.5)	24 (3.8)	75 (3.7)	8 (2.0)	79 (2.9)
Korea, Rep. of	97 (1.0)	3 (1.0)	68 (3.0)	32 (3.0)	17 (2.6)	77 (2.9)	14 (2.2)	69 (2.7)
Lebanon	73 (4.0)	23 (3.9)	43 (4.2)	55 (4.2)	20 (3.4)	67 (4.0)	10 (2.9)	30 (3.8)
Lithuania	98 (1.3)	2 (1.3)	10 (2.4)	77 (3.1)	10 (2.3)	89 (2.4)	4 (1.5)	66 (3.6)
Macedonia, Rep. of	r 83 (3.5)	17 (3.5)	r 28 (3.5)	63 (3.6)	r 22 (3.7)	74 (3.9)	r 7 (2.4)	62 (4.1)
Malaysia	83 (2.8)	17 (2.8)	20 (3.0)	78 (3.2)	19 (2.9)	76 (3.2)	6 (1.8)	59 (3.7)
Morocco	48 (3.2)	51 (3.3)	61 (3.5)	34 (3.4)	50 (4.0)	39 (3.5)	10 (1.5)	17 (2.3)
New Zealand	39 (3.8)	53 (3.7)	22 (3.9)	77 (3.9)	16 (2.7)	74 (3.7)	12 (2.2)	57 (3.5)
Norway	94 (1.9)	6 (1.9)	29 (3.9)	68 (4.1)	5 (1.7)	89 (2.8)	s 5 (2.2)	82 (4.4)
Oman	55 (3.3)	45 (3.3)	43 (3.5)	54 (3.5)	39 (3.0)	60 (3.1)	3 (0.8)	69 (2.9)
Palestinian Nat'l Auth.	85 (2.8)	15 (2.8)	51 (4.0)	49 (4.0)	35 (3.9)	64 (3.9)	5 (1.9)	57 (3.8)
Qatar	68 (2.8)	30 (2.6)	53 (3.2)	45 (3.0)	42 (4.3)	56 (4.3)	34 (3.2)	51 (3.7)
Romania	67 (3.6)	26 (3.2)	45 (3.9)	55 (3.9)	49 (4.1)	51 (4.1)	7 (2.0)	52 (4.3)
Russian Federation	88 (2.1)	12 (2.1)	6 (1.8)	86 (2.5)	16 (2.6)	82 (2.7)	3 (1.2)	67 (3.6)
Saudi Arabia	91 (2.5)	9 (2.5)	51 (3.9)	46 (3.9)	33 (4.2)	63 (4.1)	22 (3.6)	50 (4.0)
Singapore	59 (2.5)	38 (2.7)	51 (2.7)	48 (2.7)	10 (1.8)	85 (1.8)	11 (1.5)	82 (2.1)
Slovenia	91 (1.7)	9 (1.7)	23 (2.8)	70 (2.9)	13 (1.9)	85 (2.1)	3 (1.3)	73 (2.9)
Sweden	r 97 (1.4)	3 (1.3)	r 6 (1.5)	90 (1.6)	r 7 (2.0)	91 (2.2)	r 4 (1.7)	46 (3.5)
Syrian Arab Republic	88 (2.7)	12 (2.5)	49 (4.8)	46 (4.6)	41 (4.3)	49 (4.6)	13 (3.0)	26 (4.0)
Thailand	79 (3.3)	21 (3.3)	47 (4.3)	53 (4.3)	16 (3.3)	74 (3.6)	5 (1.8)	57 (3.8)
Tunisia	77 (3.5)	23 (3.5)	75 (3.4)	22 (3.4)	39 (3.9)	51 (4.3)	1 (0.9)	20 (3.1)
Turkey	81 (2.5)	17 (2.5)	37 (3.3)	61 (3.3)	23 (2.8)	72 (2.8)	10 (2.1)	54 (3.2)
Ukraine	83 (3.3)	17 (3.3)	4 (1.7)	85 (2.7)	22 (3.6)	77 (3.7)	1 (0.5)	53 (4.4)
United Arab Emirates	87 (1.8)	12 (1.8)	38 (2.5)	62 (2.5)	42 (2.7)	54 (2.5)	20 (2.0)	55 (2.4)
United States	r 48 (2.5)	43 (2.7)	r 19 (2.2)	77 (2.4)	r 17 (2.0)	75 (2.2)	r 14 (1.7)	62 (2.8)
International Avg.	77 (0.4)	21 (0.4)	34 (0.5)	62 (0.5)	23 (0.5)	71 (0.5)	7 (0.3)	55 (0.5)

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 8.26: Resources Teachers Use for Teaching Mathematics (Continued)

Country	Percent of Students Whose Teachers Use							
	Textbooks		Workbooks or Worksheets		Concrete Objects or Materials that Help Students Understand Quantities or Procedures		Computer Software for Mathematics Instruction	
	As Basis for Instruction	As a Supplement	As Basis for Instruction	As a Supplement	As Basis for Instruction	As a Supplement	As Basis for Instruction	As a Supplement
Ninth Grade Participants								
Botswana	75 (3.8)	25 (3.8)	19 (3.3)	61 (4.6)	27 (3.8)	68 (4.0)	1 (0.7)	20 (3.7)
Honduras	r 52 (4.6)	40 (4.7)	r 30 (4.1)	65 (4.3)	r 20 (3.9)	62 (4.7)	r 4 (2.0)	33 (4.8)
South Africa	71 (3.5)	27 (3.4)	43 (3.7)	51 (3.7)	16 (3.0)	71 (3.7)	5 (1.7)	19 (2.9)
Benchmarking Participants								
Alberta, Canada	59 (3.8)	36 (3.5)	15 (2.9)	77 (3.7)	26 (3.3)	73 (3.3)	11 (2.1)	66 (3.9)
Ontario, Canada	59 (3.6)	38 (3.7)	22 (3.6)	77 (3.5)	18 (3.0)	80 (3.0)	7 (1.7)	67 (4.1)
Quebec, Canada	45 (4.2)	48 (4.2)	54 (4.7)	46 (4.7)	17 (3.2)	77 (3.5)	6 (1.1)	42 (4.3)
Abu Dhabi, UAE	85 (3.5)	15 (3.5)	46 (4.4)	53 (4.4)	47 (4.2)	49 (4.1)	14 (3.1)	56 (4.3)
Dubai, UAE	81 (1.9)	17 (1.9)	29 (3.1)	69 (3.0)	36 (4.6)	59 (4.7)	25 (2.3)	60 (3.3)
Alabama, US	r 59 (9.1)	40 (9.0)	r 17 (4.2)	79 (6.1)	r 16 (3.8)	84 (3.8)	r 10 (3.7)	74 (6.0)
California, US	s 57 (6.7)	39 (6.6)	s 18 (5.2)	73 (5.7)	s 18 (4.3)	66 (5.6)	s 20 (6.2)	47 (7.5)
Colorado, US	r 71 (6.2)	24 (6.1)	r 8 (4.1)	84 (4.5)	r 14 (4.3)	79 (4.8)	r 9 (3.6)	68 (5.7)
Connecticut, US	r 41 (6.1)	53 (6.2)	r 21 (4.5)	75 (5.0)	r 18 (4.1)	77 (4.5)	r 14 (3.8)	58 (5.2)
Florida, US	r 61 (6.6)	33 (6.2)	r 19 (4.5)	81 (4.5)	r 9 (3.6)	90 (3.7)	r 23 (5.8)	60 (6.8)
Indiana, US	r 54 (7.0)	37 (6.0)	r 14 (4.5)	84 (4.8)	r 12 (3.9)	71 (5.8)	r 16 (4.5)	57 (6.8)
Massachusetts, US	r 56 (5.9)	38 (6.0)	r 12 (3.3)	84 (4.1)	r 13 (4.0)	81 (5.8)	r 9 (2.9)	64 (6.1)
Minnesota, US	r 82 (5.4)	16 (5.0)	r 10 (4.0)	83 (5.4)	r 7 (2.8)	78 (5.6)	r 13 (3.0)	75 (4.6)
North Carolina, US	r 39 (7.5)	52 (6.7)	r 17 (5.0)	82 (5.2)	r 17 (5.6)	67 (6.5)	r 13 (4.7)	63 (6.8)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Teacher Instructional Activities in Mathematics Class

There are a myriad of instructional approaches that can be used in teaching mathematics. However, effective instructional approaches often involve helping students improve their problem solving skills (a goal highlighted by the US National Council for Teachers of Mathematics (NCTM)). Also, collaborative problem solving activities have been found to be beneficial from several perspectives. For example, students in groups can discuss the merits of different proposed solutions and learn multiple strategies. Also, because they can help each other, students in groups can often handle challenging situations beyond the capabilities of individuals.

Exhibit 8.27 presents teachers' reports at the fourth grade about how much they use several common instructional approaches for teaching mathematics. The exhibit provides the percentage of fourth grade students asked to do the activity in "Every or Almost Every Lesson." Internationally, on average, the majority of fourth grade students (55%) are asked to work problems with teacher guidance (individually or in groups) in almost every mathematics lesson. It is relatively rare for teachers to ask students (16% on average) to work problems without teacher guidance (individually or in groups); more common is working problems as part of whole class instruction directed by the teacher, used with 45 percent of the students in almost every lesson. The two strategies queried were: asking students to memorize rules, procedures, and facts; and asking students to explain their answers. On average, internationally, 62 percent of the students were asked for explanations in almost every lesson, whereas fewer (37%) were asked to memorize. Looking across the countries at the fourth grade and sixth grade, as well as the benchmarking participants, there was considerable variation, in particular, for guided problem solving and memorization.

Exhibit 8.28 presents teachers reports about instructional approaches at the eighth grade. The use of the different configurations for problem solving activities corresponds closely to that reported at fourth grade. Internationally, on average, working problems with teacher guidance (individually or in groups) occurred in almost every lesson for 55 percent of students, working problems without teacher guidance (individually or in groups) for 14 percent of students, and working problems together as a whole class with direct teacher guidance for 48 percent of students. Regarding the strategies, internationally, 60 percent of the eighth grade students were asked for explanations and 45 percent to memorize, on average. At the eighth grade, teachers also reported on asking

students to apply facts, concepts, and procedures; and just about half of the students (49%) did application tasks in almost every lesson, on average. In general, the instructional approaches used at the ninth grade and by the benchmarking participants followed the international eighth grade pattern.

Computer Activities During Mathematics Lessons

According to the *TIMSS 2011 Encyclopedia*, countries are investing in technology as a way to enhance teaching and learning. Availability of computers and other technology in the mathematics classroom can facilitate successful implementation of the curriculum. For example, as described in Contextual Framework chapter of the *TIMSS 2011 Assessment Frameworks*, computers and the Internet provide students ways to explore concepts in-depth, trigger enthusiasm and motivation for learning, enable students to learn at their own pace, and provide students with access to vast information sources.

Besides giving students access to the Internet, computers can serve a number of other educational purposes. While initially limited to learning drills and practice, they are now used in a variety of ways including tutorials, simulations, games, and applications. New software enables students to pose their own problems and explore and discover mathematics and scientific properties on their own. Computer software for modeling and visualization of ideas can open a whole new world to students and help them connect these ideas to their language and symbol systems. A recent study summarizing 25 meta-analyses determined that computer use in the classroom has a significant positive effect on achievement at all grade levels and in all subjects (Tamim, Bernard, Borokhovski, Abrami, & Schmid, 2011).

Exhibit 8.29 contains teachers' reports about the prevalence and types of computer-based activities used as part of mathematics instruction at the fourth grade. The range of computer availability across countries was very large, from 5 percent of the students in Iran to 87 percent in New Zealand. Internationally, on average, less than half (42%) of the fourth grade students had computers available during their mathematics lessons. Interestingly, average mathematics achievement was equivalent between those fourth grade students with computers available and those without computers available.

Teachers reported that 26 to 27 percent of the fourth grade students, on average, were asked to use a computer at least monthly to explore mathematics principles and concepts and to look up ideas and information. Somewhat larger percentages, about one-third, were asked to use a computer at least

Exhibit 8.27: Teacher Instructional Activities in Mathematics Class

TIMSS 2011 4th Grade Mathematics

Reported by Teachers

Country	Percent of Students Doing the Following Activities Every or Almost Every Lesson									
	Work Problems (Individually or with Peers) with Teacher Guidance		Work Problems Together in the Whole Class with Direct Teacher Guidance		Work Problems (Individually or with Peers) While Teacher Occupied by Other Tasks		Memorize Rules, Procedures, and Facts		Explain Their Answers	
Armenia		49 (3.9)		53 (3.4)		6 (1.8)		63 (3.6)		70 (3.7)
Australia	r	46 (4.0)	r	40 (3.8)	s	22 (3.7)	r	13 (2.3)	r	61 (4.4)
Austria		30 (3.5)		22 (3.4)		3 (1.0)		1 (0.8)		27 (3.3)
Azerbaijan		57 (3.8)		48 (3.7)		20 (2.5)		77 (3.0)		71 (3.3)
Bahrain		67 (4.0)		54 (4.4)		18 (4.1)		56 (5.1)		74 (4.1)
Belgium (Flemish)		27 (3.3)		17 (2.6)		4 (1.0)		3 (1.1)		49 (3.7)
Chile	r	61 (4.4)	r	66 (4.0)	r	16 (3.4)	r	36 (4.7)	r	77 (3.9)
Chinese Taipei		51 (4.0)		55 (4.2)		19 (3.3)		42 (3.3)		32 (3.9)
Croatia		53 (2.9)		54 (3.3)		6 (1.5)		49 (3.4)		45 (3.7)
Czech Republic		61 (3.5)		37 (4.2)		9 (2.8)		3 (1.3)		61 (3.4)
Denmark	r	62 (3.9)	r	23 (3.8)	r	8 (2.2)	r	7 (2.3)	r	41 (3.6)
England		62 (4.1)		37 (4.2)		19 (3.3)		23 (3.7)		79 (3.6)
Finland		73 (3.0)		24 (3.2)		10 (2.2)		17 (2.9)		36 (3.2)
Georgia		61 (3.9)		47 (4.0)		11 (2.4)		63 (3.4)		77 (3.3)
Germany		40 (3.5)		20 (2.9)		7 (1.9)		6 (1.6)		50 (3.3)
Hong Kong SAR		32 (3.7)		27 (4.0)		8 (2.0)		4 (1.7)		34 (3.9)
Hungary		65 (3.4)		40 (3.7)		13 (2.6)		10 (2.0)		87 (2.3)
Iran, Islamic Rep. of		68 (3.9)		55 (4.0)		32 (4.0)		55 (3.3)		72 (2.7)
Ireland		53 (3.8)		53 (3.4)		24 (3.3)		30 (3.9)		59 (3.9)
Italy		24 (3.1)		21 (3.3)		4 (1.2)		41 (3.9)		57 (3.8)
Japan		76 (3.3)		74 (3.4)		8 (2.2)		42 (4.1)		43 (3.3)
Kazakhstan		69 (3.8)		67 (3.5)		42 (3.9)		73 (4.0)		78 (3.1)
Korea, Rep. of		67 (3.8)		72 (3.9)		35 (3.6)		38 (4.5)		32 (3.9)
Kuwait		29 (3.5)		40 (3.4)		8 (2.3)		71 (3.5)		74 (3.3)
Lithuania		72 (2.7)		53 (3.3)		10 (2.0)		44 (3.3)		71 (3.4)
Malta		47 (0.1)		49 (0.1)		13 (0.1)		26 (0.1)		68 (0.1)
Morocco	r	69 (3.6)	r	60 (4.1)	r	21 (3.6)	r	73 (3.3)	r	65 (3.9)
Netherlands	r	37 (4.5)	r	21 (3.5)	r	20 (3.7)	r	10 (2.7)	r	53 (4.6)
New Zealand		59 (2.6)		23 (2.2)		35 (3.1)		12 (1.8)		69 (2.6)
Northern Ireland	r	58 (4.0)	r	39 (4.4)	r	15 (3.1)	r	23 (3.8)	r	64 (4.6)
Norway		72 (4.6)		33 (4.2)		4 (1.0)		9 (1.8)		27 (3.9)
Oman		69 (2.9)		41 (3.1)		8 (1.5)		59 (3.1)		68 (2.9)
Poland		63 (3.5)		69 (3.3)		25 (3.5)		48 (3.6)		88 (2.1)
Portugal		52 (4.7)		43 (4.7)		11 (2.5)		42 (4.9)		80 (3.3)
Qatar		56 (5.2)		53 (3.7)		23 (4.4)		60 (4.2)		76 (3.8)
Romania		78 (3.3)		77 (3.0)		13 (2.7)		37 (3.0)		84 (3.1)
Russian Federation		59 (3.9)		56 (4.0)		35 (3.4)		29 (3.3)		89 (2.2)
Saudi Arabia		56 (4.7)		61 (3.9)		21 (4.1)		56 (4.4)		65 (4.1)
Serbia		63 (4.3)		43 (4.2)		2 (1.1)		69 (4.1)		75 (3.3)
Singapore		36 (2.5)		37 (2.6)		15 (1.9)		20 (2.2)		48 (2.6)
Slovak Republic		57 (3.3)		49 (3.6)		8 (2.3)		11 (2.1)		64 (3.5)
Slovenia		37 (3.2)		13 (2.3)		11 (2.2)		5 (1.4)		64 (3.4)
Spain		52 (3.9)		44 (3.8)		17 (3.1)		34 (3.8)		75 (3.3)
Sweden	r	48 (4.0)	r	26 (3.9)	r	8 (2.3)	r	13 (3.3)	r	40 (4.2)
Thailand		55 (3.5)		53 (4.6)		30 (3.7)		56 (4.4)		55 (4.2)
Tunisia		69 (3.6)		50 (3.9)		12 (2.5)		72 (3.9)		67 (4.2)
Turkey		55 (3.5)		50 (3.5)		23 (2.9)		63 (3.5)		67 (3.4)
United Arab Emirates		57 (2.0)		49 (2.2)		13 (1.5)		49 (2.6)		79 (1.6)
United States	r	76 (2.2)	r	79 (1.9)	r	32 (2.6)	r	31 (2.3)	r	75 (2.2)
Yemen		34 (4.2)		39 (4.2)		7 (1.9)		55 (4.2)		38 (4.1)
International Avg.		55 (0.5)		45 (0.5)		16 (0.4)		37 (0.5)		62 (0.5)

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 8.27: Teacher Instructional Activities in Mathematics Class (Continued)

Country	Percent of Students Doing the Following Activities Every or Almost Every Lesson									
	Work Problems (Individually or with Peers) with Teacher Guidance		Work Problems Together in the Whole Class with Direct Teacher Guidance		Work Problems (Individually or with Peers) While Teacher Occupied by Other Tasks		Memorize Rules, Procedures, and Facts		Explain Their Answers	
Sixth Grade Participants										
Botswana		68 (4.2)		64 (3.7)		37 (4.2)		59 (4.8)	r	71 (4.5)
Honduras		61 (4.7)		58 (4.5)		35 (4.8)		59 (4.5)		77 (4.3)
Yemen		30 (4.0)		44 (4.1)		7 (2.2)		66 (4.1)		45 (4.3)
Benchmarking Participants										
Alberta, Canada	r	49 (4.7)	r	39 (4.7)	r	14 (3.4)	r	4 (1.5)	r	60 (4.8)
Ontario, Canada		47 (3.5)		43 (3.5)		14 (2.7)		8 (1.9)		62 (3.7)
Quebec, Canada		37 (4.7)		35 (4.9)		14 (3.1)		29 (3.9)		49 (4.5)
Abu Dhabi, UAE		58 (4.2)		40 (4.4)		13 (2.8)		45 (4.7)		80 (3.2)
Dubai, UAE		61 (2.6)	r	52 (3.0)	r	18 (3.3)		52 (2.8)	r	83 (2.4)
Florida, US	s	78 (4.9)	r	85 (3.9)	r	31 (4.9)	r	35 (4.3)	r	83 (3.6)
North Carolina, US		80 (3.8)		77 (5.1)		23 (5.5)		27 (5.3)		94 (2.6)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 8.28: Teacher Instructional Activities in Mathematics Class

TIMSS 2011 Mathematics 8th Grade

Reported by Teachers

Country	Percent of Students Doing the Following Activities Every or Almost Every Lesson					
	Work Problems (Individually or with Peers) with Teacher Guidance	Work Problems Together in the Whole Class with Direct Teacher Guidance	Work Problems (Individually or with Peers) While Teacher Occupied by Other Tasks	Memorize Rules, Procedures, and Facts	Explain Their Answers	Apply Facts, Concepts, and Procedures
Armenia	45 (3.8)	37 (3.6)	4 (1.5)	73 (2.9)	71 (3.6)	71 (3.4)
Australia	r 64 (4.2)	r 43 (4.2)	r 25 (3.3)	r 32 (3.0)	r 46 (5.0)	r 60 (4.6)
Bahrain	58 (2.8)	50 (2.9)	22 (2.2)	70 (2.3)	74 (2.7)	61 (3.2)
Chile	60 (3.9)	59 (3.6)	10 (2.5)	33 (4.0)	73 (3.8)	60 (3.6)
Chinese Taipei	36 (3.7)	41 (3.6)	9 (2.3)	51 (4.0)	20 (3.1)	38 (4.5)
England	69 (4.0)	32 (4.2)	9 (1.8)	24 (3.9)	66 (3.7)	43 (4.8)
Finland	83 (2.6)	28 (2.6)	6 (1.5)	13 (2.5)	36 (3.5)	37 (3.5)
Georgia	58 (3.7)	31 (3.6)	4 (1.5)	80 (3.3)	76 (3.0)	28 (3.1)
Ghana	69 (4.0)	65 (4.4)	26 (3.8)	49 (3.9)	68 (4.4)	70 (3.6)
Hong Kong SAR	55 (3.8)	46 (4.3)	11 (2.7)	14 (3.2)	27 (3.9)	37 (4.3)
Hungary	56 (3.8)	43 (3.7)	8 (2.0)	16 (2.7)	75 (3.0)	33 (3.4)
Indonesia	69 (4.8)	74 (4.2)	18 (3.3)	74 (4.6)	77 (3.7)	56 (4.9)
Iran, Islamic Rep. of	52 (3.8)	45 (3.9)	16 (2.1)	38 (3.4)	68 (3.2)	48 (3.7)
Israel	69 (3.0)	61 (2.9)	22 (2.3)	33 (3.0)	72 (2.7)	54 (3.4)
Italy	47 (3.8)	43 (3.7)	4 (1.4)	57 (3.5)	56 (3.9)	32 (3.6)
Japan	65 (3.5)	49 (3.9)	9 (2.1)	48 (3.9)	24 (3.6)	24 (3.3)
Jordan	41 (3.5)	56 (3.8)	11 (2.3)	53 (3.9)	66 (3.6)	57 (3.2)
Kazakhstan	57 (3.8)	62 (4.1)	30 (3.6)	65 (3.8)	75 (3.7)	73 (4.0)
Korea, Rep. of	67 (2.9)	77 (2.7)	45 (3.0)	46 (3.1)	21 (2.6)	68 (2.9)
Lebanon	48 (3.9)	50 (4.1)	15 (3.3)	71 (3.8)	75 (3.6)	46 (4.7)
Lithuania	65 (3.8)	55 (3.3)	6 (2.0)	65 (2.8)	65 (3.6)	65 (3.3)
Macedonia, Rep. of	r 45 (4.7)	r 35 (3.9)	r 10 (2.6)	r 58 (4.7)	r 65 (4.4)	r 38 (4.3)
Malaysia	49 (4.0)	58 (3.5)	25 (3.6)	55 (3.9)	64 (3.7)	49 (3.8)
Morocco	53 (3.8)	50 (3.4)	14 (2.4)	54 (3.6)	72 (2.9)	54 (3.8)
New Zealand	68 (3.9)	39 (2.9)	19 (2.5)	19 (2.9)	52 (3.4)	50 (3.2)
Norway	75 (3.7)	25 (3.7)	6 (1.9)	12 (2.8)	21 (3.4)	19 (3.2)
Oman	63 (2.7)	58 (3.3)	5 (1.4)	66 (3.1)	68 (2.7)	48 (3.3)
Palestinian Nat'l Auth.	57 (3.9)	55 (4.1)	13 (2.7)	59 (3.9)	79 (3.7)	54 (4.5)
Qatar	49 (4.4)	51 (3.2)	21 (3.0)	41 (5.0)	75 (3.4)	45 (4.5)
Romania	67 (3.9)	67 (3.2)	9 (2.1)	59 (4.4)	79 (2.9)	46 (3.6)
Russian Federation	47 (3.5)	54 (3.7)	13 (2.8)	37 (3.1)	70 (3.2)	74 (2.7)
Saudi Arabia	53 (3.8)	57 (4.3)	16 (3.1)	43 (3.7)	65 (4.1)	54 (4.4)
Singapore	41 (2.5)	40 (2.4)	8 (1.5)	21 (2.1)	30 (2.5)	46 (2.6)
Slovenia	37 (3.1)	29 (2.5)	4 (1.3)	7 (1.4)	46 (2.6)	41 (2.7)
Sweden	r 34 (3.5)	r 18 (2.7)	r 10 (2.0)	r 16 (2.8)	r 51 (3.5)	r 27 (3.1)
Syrian Arab Republic	21 (3.9)	35 (4.0)	7 (2.2)	60 (4.6)	70 (4.1)	30 (3.9)
Thailand	54 (4.0)	51 (4.6)	21 (3.5)	53 (3.7)	57 (4.6)	26 (3.8)
Tunisia	51 (4.3)	52 (3.9)	9 (2.2)	49 (3.9)	71 (3.5)	51 (4.0)
Turkey	52 (3.6)	41 (3.3)	16 (2.2)	75 (2.9)	71 (2.9)	38 (2.9)
Ukraine	45 (4.6)	55 (4.4)	8 (2.1)	38 (4.3)	60 (4.0)	78 (3.5)
United Arab Emirates	53 (2.4)	47 (2.3)	15 (1.7)	44 (2.6)	75 (2.0)	59 (2.2)
United States	r 75 (2.6)	r 67 (2.6)	r 26 (2.5)	r 23 (2.7)	r 64 (2.6)	r 65 (2.6)
International Avg.	55 (0.6)	48 (0.6)	14 (0.4)	45 (0.5)	60 (0.5)	49 (0.6)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

Exhibit 8.28: Teacher Instructional Activities in Mathematics Class (Continued)

Country	Percent of Students Doing the Following Activities Every or Almost Every Lesson											
	Work Problems (Individually or with Peers) with Teacher Guidance		Work Problems Together in the Whole Class with Direct Teacher Guidance		Work Problems (Individually or with Peers) While Teacher Occupied by Other Tasks		Memorize Rules, Procedures, and Facts		Explain Their Answers		Apply Facts, Concepts, and Procedures	
Ninth Grade Participants												
Botswana		63 (4.1)		45 (3.6)		14 (3.0)		39 (4.5)		57 (4.2)		48 (4.8)
Honduras	r	63 (4.3)	r	63 (4.3)	r	9 (2.5)	r	52 (4.4)	r	81 (3.4)	r	47 (4.7)
South Africa		53 (4.1)		56 (3.6)		16 (3.1)		45 (4.0)		68 (3.6)		62 (3.9)
Benchmarking Participants												
Alberta, Canada		62 (3.9)		52 (4.4)		23 (3.6)		10 (2.5)		58 (3.5)		46 (4.4)
Ontario, Canada		49 (3.7)		45 (4.0)		17 (2.8)		10 (2.3)		64 (3.9)		43 (3.7)
Quebec, Canada		56 (4.3)		54 (4.5)		18 (3.2)		34 (4.0)		45 (3.9)		40 (3.7)
Abu Dhabi, UAE		55 (4.2)		48 (4.3)		17 (3.1)		49 (3.6)		76 (3.0)		62 (3.8)
Dubai, UAE		55 (4.6)		44 (2.9)		18 (2.8)		43 (4.5)		73 (3.9)		61 (3.6)
Alabama, US	s	83 (4.9)	s	81 (5.5)	s	25 (6.6)	s	16 (4.7)	s	69 (5.7)	s	75 (5.4)
California, US	s	70 (6.6)	s	77 (5.1)	s	13 (4.2)	s	36 (7.3)	s	63 (5.4)	s	65 (7.6)
Colorado, US	r	80 (4.3)	r	60 (6.7)	r	27 (6.0)	r	16 (5.5)	r	67 (6.0)	r	56 (7.0)
Connecticut, US	r	68 (6.2)	r	62 (5.6)	r	13 (3.9)	r	10 (2.9)	r	68 (5.2)	r	51 (6.3)
Florida, US	r	79 (4.2)	s	73 (5.5)	s	23 (5.6)	r	27 (5.5)	s	72 (6.7)	s	70 (6.4)
Indiana, US	r	78 (5.0)	r	71 (3.8)	r	31 (5.4)	r	26 (5.3)	r	38 (5.3)	r	59 (7.1)
Massachusetts, US	r	64 (5.2)	r	47 (6.2)	r	16 (5.6)	r	12 (4.6)	r	63 (6.5)	r	52 (5.3)
Minnesota, US	r	76 (4.9)	r	69 (5.6)	r	32 (5.0)	r	7 (3.5)	r	60 (6.6)	r	56 (6.2)
North Carolina, US	r	78 (5.8)	r	70 (5.6)	r	16 (4.0)	r	20 (4.7)	r	70 (5.7)	r	72 (5.8)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

monthly to practice skills and procedures. The range in computer availability across the benchmarking participants reflected the fourth grade results across countries. However, the students participating at the sixth grade had less access to computers for mathematics instruction than did the fourth grade TIMSS students, on average.

At the eighth grade, reports about computer availability and use were similar to those at the fourth grade (see Exhibit 8.30). Internationally, on average, about one-third of students had computers available during their mathematics lessons, ranging from 5 percent in Tunisia to 76 percent in Norway. Students with computers available during their lessons had slightly higher mathematics achievement than students without computers available. Approximately, 21 to 24 percent of the eighth grade students were asked to do the following on at least a monthly basis: explore mathematics principles and concepts, look up ideas and information, process and analyze data, and practice skills and procedures. As would be anticipated, computer use varied considerably across countries at the eighth grade, as well as for the benchmarking participants. Countries participating at the ninth grade had less computer availability, including South Africa, Botswana, and Honduras.

Mathematics Homework

Homework is a way to extend instruction and assess student progress. TIMSS has consistently shown that the amount of homework assigned for mathematics and science varies both within and across countries. In some situations, homework is assigned typically to students who need it the most to keep up with their classmates. In other situations, students receive homework for practice or as an enrichment exercise. Because of the different approaches and policies associated with assigning homework, it generally shows mixed results in relation to average student achievement.

The eighth grade students in TIMSS were asked how often their teacher gives homework in mathematics and how much time they usually spend on it when it is given. Weekly time on mathematics homework was estimated by multiplying the frequency of assignment by the amount of time spent. Exhibit 8.31 presents the results, with countries ordered by the percentage of students reporting they spent 3 hours or more per week. The range was from a high of 44 percent of students in Romania to 1 percent in England. It should be mentioned that although students in several of the high-performing East Asian countries report relatively small amounts of homework, many of them attend special tutoring schools. On average, internationally, only 15 percent of

the eighth grade students reported doing as much as 3 hours of mathematics homework per week. In fact, almost half (48%) reported doing 45 minutes or less of weekly mathematics homework. Thirty-eight percent reported doing more than 45 minutes but less than 3 hours, and these students had the highest average mathematics achievement. The ninth grade and benchmarking participants had comparably smaller percentages of students reporting 3 hours or more of mathematics homework per week, although the percentages reporting less than 3 hours of weekly homework were more similar to the international averages at eighth grade.

Mathematics Classroom Assessment

Teachers have a number of informal and formal ways to evaluate student learning. Informal assessments during instruction help teachers identify the needs of particular individuals, gauge the pace of instruction, and signal the need to adapt or reteach. Formal tests typically are used to make important decisions about the students, such as grades or marks.

Exhibit 8.32 presents teachers' reports about how often they give eighth grade students mathematics tests or examinations. Internationally, on average, eighth grade students are tested regularly in mathematics—45 percent at least every two weeks and 40 percent about monthly. Only 15 percent were tested less often, approximately a few times a year, on average. Teachers in the high-performing countries of Chinese Taipei and the Russian Federation tested almost all of the eighth grade students (97–98%) at least every two weeks, although students in other high-performing countries were tested less often.

The exhibit also contains teachers' reports about the types of questions they included in their tests and examinations. Most frequently, the test questions involved applications of mathematical procedures. This type of question was used always or almost always for 77 percent of the students, on average, across the countries, and at least sometimes for the remaining 23 percent of the students. Test questions involving searching for patterns and relationships were used always or almost always for 31 percent of the students, on average, sometimes for 64 percent of the students, and rarely for 5 percent of the students. Test questions that required students to provide explanations or justifications for their answers were used almost always for 37 percent of students and sometimes for 56 percent, with only 8 percent almost never. However, across the eighth grade, ninth grade, and benchmarking participants, there was considerable variation in testing practices.

Exhibit 8.29: Computer Activities During Mathematics Lessons

TIMSS 2011 Mathematics 4th Grade

Reported by Teachers

Country	Computers Available for Mathematics Lessons			Percent of Students Whose Teachers Have Them Use Computers At Least Monthly		
	Percent of Students	Average Achievement				
	Yes	Yes	No	To Explore Mathematics Principles and Concepts	To Look Up Ideas and Information	To Practice Skills and Procedures
New Zealand	87 (2.0)	487 (2.9)	481 (6.5)	73 (2.6)	63 (2.9)	84 (2.4)
Netherlands	r 83 (3.3)	540 (2.1)	532 (5.2)	r 57 (5.2)	r 46 (4.9)	r 82 (3.4)
Australia	r 79 (2.8)	521 (4.1)	517 (7.3)	r 60 (3.3)	r 56 (3.5)	r 70 (3.3)
Norway	77 (3.6)	495 (3.1)	494 (6.1)	40 (4.6)	35 (4.3)	68 (4.0)
Northern Ireland	r 76 (3.9)	561 (4.3)	570 (6.4)	r 66 (4.4)	r 62 (4.4)	r 74 (4.0)
England	71 (4.2)	545 (3.9)	542 (8.0)	55 (4.4)	41 (4.4)	60 (4.3)
Denmark	r 70 (3.4)	541 (3.0)	537 (5.0)	r 38 (3.9)	r 40 (4.1)	r 63 (3.8)
Malta	69 (0.1)	488 (1.4)	515 (2.9)	56 (0.1)	44 (0.1)	59 (0.1)
Kazakhstan	66 (3.5)	499 (6.0)	507 (7.9)	56 (3.7)	59 (3.6)	61 (3.6)
Singapore	65 (2.6)	607 (4.4)	603 (4.4)	54 (2.4)	46 (2.7)	54 (2.3)
United States	r 63 (2.2)	541 (2.3)	544 (3.7)	r 43 (2.6)	r 37 (2.5)	r 53 (2.3)
Austria	62 (3.5)	510 (2.7)	506 (4.6)	23 (3.1)	24 (2.5)	48 (3.3)
Chile	r 60 (3.8)	461 (4.2)	458 (5.7)	r 42 (4.2)	r 47 (4.3)	r 51 (4.0)
Sweden	r 60 (5.0)	508 (3.0)	501 (4.6)	r 21 (3.6)	r 18 (3.3)	r 53 (5.1)
Finland	59 (3.1)	549 (2.5)	542 (3.6)	23 (2.9)	20 (3.2)	50 (3.5)
Japan	58 (3.5)	585 (2.4)	587 (2.6)	5 (1.9)	9 (2.1)	10 (1.9)
Germany	58 (3.1)	529 (2.9)	527 (3.4)	29 (3.2)	27 (2.8)	46 (3.1)
Ireland	55 (3.2)	528 (4.1)	527 (3.5)	42 (3.3)	33 (3.8)	43 (3.5)
Belgium (Flemish)	52 (4.6)	551 (2.8)	547 (2.9)	19 (3.2)	26 (3.5)	49 (4.5)
Czech Republic	50 (4.4)	509 (4.2)	512 (2.5)	21 (3.3)	27 (3.8)	43 (4.0)
Lithuania	44 (3.6)	538 (4.6)	530 (3.1)	34 (3.7)	36 (3.7)	39 (3.5)
Portugal	43 (5.3)	539 (7.1)	528 (4.4)	32 (4.2)	37 (5.4)	33 (4.4)
Chinese Taipei	41 (3.6)	591 (3.1)	591 (2.9)	27 (3.8)	27 (3.8)	30 (3.6)
Qatar	40 (5.5)	399 (9.7)	420 (5.3)	29 (5.2)	33 (5.4)	33 (5.5)
Hong Kong SAR	39 (4.6)	601 (6.5)	602 (5.2)	25 (4.3)	22 (4.0)	25 (3.7)
Slovak Republic	38 (3.3)	518 (3.8)	499 (4.9)	28 (2.9)	32 (3.1)	35 (3.3)
Spain	36 (3.6)	490 (4.6)	478 (3.5)	18 (3.4)	20 (3.3)	27 (3.3)
Turkey	36 (3.4)	498 (5.4)	453 (6.0)	33 (3.4)	33 (3.6)	33 (3.5)
Hungary	34 (3.6)	509 (7.6)	517 (4.7)	14 (2.6)	17 (2.9)	25 (3.5)
Slovenia	31 (3.6)	512 (3.9)	514 (2.8)	13 (2.2)	21 (2.7)	25 (3.0)
Korea, Rep. of	31 (3.7)	606 (3.3)	604 (2.5)	14 (3.0)	19 (3.1)	13 (3.0)
Russian Federation	31 (3.3)	546 (7.0)	540 (4.0)	24 (2.8)	23 (2.7)	27 (2.7)
Azerbaijan	30 (3.7)	467 (10.8)	461 (7.4)	20 (3.3)	22 (3.5)	21 (3.4)
United Arab Emirates	29 (2.0)	438 (5.1)	435 (2.8)	24 (1.9)	25 (1.9)	25 (1.9)
Bahrain	27 (3.2)	433 (6.5)	437 (4.4)	22 (3.0)	24 (3.2)	22 (3.0)
Italy	25 (2.9)	515 (4.9)	507 (3.1)	19 (2.8)	19 (2.7)	23 (2.9)
Armenia	24 (3.4)	458 (8.0)	450 (4.2)	11 (2.4)	14 (2.6)	14 (2.6)
Romania	24 (3.4)	486 (12.1)	480 (6.6)	18 (3.4)	19 (3.4)	21 (3.6)
Kuwait	21 (3.0)	341 (8.9)	342 (3.7)	15 (3.1)	16 (2.9)	17 (3.0)
Saudi Arabia	21 (3.5)	402 (10.0)	411 (6.3)	18 (3.2)	19 (3.3)	19 (3.3)
Georgia	19 (3.1)	463 (8.9)	448 (4.6)	14 (2.6)	14 (2.9)	14 (2.6)
Yemen	19 (3.4)	226 (14.5)	253 (7.3)	6 (2.1)	7 (2.2)	7 (2.4)
Poland	16 (2.8)	474 (5.2)	482 (2.4)	7 (1.9)	11 (2.5)	15 (2.6)
Oman	15 (1.9)	378 (8.4)	387 (3.1)	10 (1.8)	12 (1.8)	12 (2.0)
Thailand	13 (2.7)	444 (11.2)	460 (5.6)	7 (2.0)	9 (2.3)	11 (2.3)
Serbia	12 (2.7)	507 (10.3)	518 (3.4)	7 (2.0)	9 (2.3)	8 (2.2)
Croatia	10 (1.9)	495 (7.3)	489 (1.9)	5 (1.3)	7 (1.6)	6 (1.4)
Morocco	r 8 (1.8)	328 (17.2)	338 (4.9)	r 5 (1.6)	r 3 (1.1)	r 3 (1.1)
Tunisia	7 (2.0)	346 (12.5)	361 (4.2)	3 (1.3)	5 (1.7)	5 (1.5)
Iran, Islamic Rep. of	5 (1.4)	453 (21.4)	429 (3.7)	4 (1.3)	3 (1.1)	3 (1.3)
International Avg.	42 (0.5)	491 (1.1)	490 (0.7)	27 (0.4)	26 (0.5)	34 (0.5)

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 8.29: Computer Activities During Mathematics Lessons (Continued)

Country	Computers Available for Mathematics Lessons			Percent of Students Whose Teachers Have Them Use Computers At Least Monthly		
	Percent of Students	Average Achievement				
	Yes	Yes	No	To Explore Mathematics Principles and Concepts	To Look Up Ideas and Information	To Practice Skills and Procedures
Sixth Grade Participants						
Yemen	12 (3.0)	339 (14.2)	352 (6.0)	4 (1.8)	4 (1.8)	4 (1.8)
Botswana	6 (2.1)	465 (16.6)	416 (4.5)	r 3 (1.2)	3 (1.5)	r 3 (1.2)
Honduras	4 (1.6)	407 (12.8)	396 (6.4)	2 (1.3)	2 (1.3)	2 (1.3)
Benchmarking Participants						
Florida, US	r 81 (4.1)	544 (4.0)	551 (10.8)	r 64 (4.2)	r 57 (5.7)	r 78 (4.4)
North Carolina, US	78 (4.6)	553 (5.4)	555 (10.0)	r 68 (5.9)	58 (5.9)	75 (5.5)
Alberta, Canada	r 60 (4.5)	508 (3.5)	505 (3.8)	r 42 (4.5)	r 35 (4.3)	r 52 (5.0)
Ontario, Canada	44 (3.6)	521 (4.0)	517 (3.9)	32 (3.3)	28 (3.5)	37 (3.5)
Dubai, UAE	38 (2.6)	482 (5.4)	466 (4.2)	r 34 (2.4)	r 33 (2.3)	r 35 (2.3)
Quebec, Canada	30 (3.8)	534 (5.5)	531 (2.4)	16 (2.8)	13 (2.7)	19 (3.3)
Abu Dhabi, UAE	26 (3.6)	418 (11.3)	420 (5.3)	22 (3.6)	24 (3.5)	23 (3.5)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 8.30: Computer Activities During Mathematics Lessons

TIMSS 2011 8th Grade Mathematics

Reported by Teachers

Country	Computers Available for Mathematics Lessons			Percent of Students Whose Teachers Have Them Use Computers At Least Monthly			
	Percent of Students	Average Achievement					
	Yes	Yes	No	To Explore Mathematics Principles and Concepts	To Look Up Ideas and Information	To Process and Analyze Data	To Practice Skills and Procedures
Norway	76 (3.5)	476 (2.9)	474 (4.5)	34 (3.7)	32 (4.0)	58 (3.8)	53 (4.3)
Kazakhstan	74 (3.4)	487 (5.0)	490 (8.6)	65 (3.8)	71 (3.6)	68 (3.6)	71 (3.7)
Australia	r 64 (4.5)	510 (7.3)	506 (7.3)	r 49 (4.0)	r 34 (4.1)	r 40 (3.8)	r 53 (4.1)
Macedonia, Rep. of	r 60 (4.3)	427 (9.2)	416 (9.6)	r 48 (4.8)	r 46 (4.6)	r 46 (4.7)	s 43 (4.8)
Japan	58 (4.2)	572 (4.4)	569 (4.2)	3 (1.4)	5 (1.6)	6 (1.9)	1 (0.8)
Singapore	56 (2.4)	614 (5.1)	606 (6.4)	38 (2.6)	26 (2.4)	24 (2.2)	34 (2.4)
Korea, Rep. of	56 (3.1)	617 (4.3)	607 (4.5)	32 (3.0)	30 (3.1)	25 (3.0)	28 (3.0)
Jordan	53 (4.0)	407 (6.1)	406 (5.9)	44 (4.1)	48 (4.3)	41 (4.1)	47 (4.1)
England	51 (4.3)	510 (8.5)	501 (7.5)	34 (4.4)	27 (3.9)	24 (4.0)	38 (4.1)
Chile	48 (3.9)	422 (4.7)	413 (4.8)	30 (3.7)	33 (3.9)	28 (3.6)	33 (3.7)
Qatar	45 (4.3)	405 (9.3)	416 (6.0)	37 (4.0)	40 (4.2)	37 (4.1)	40 (4.2)
Russian Federation	44 (3.5)	545 (4.5)	535 (5.5)	36 (3.6)	40 (3.4)	29 (3.4)	40 (3.3)
United States	r 44 (2.5)	504 (4.6)	518 (4.8)	r 25 (2.3)	r 20 (2.3)	r 21 (2.4)	r 27 (2.4)
Georgia	44 (3.6)	427 (7.4)	429 (5.2)	29 (3.9)	37 (3.7)	34 (3.8)	29 (3.7)
Finland	43 (3.8)	518 (3.4)	511 (3.0)	12 (2.5)	15 (2.3)	14 (3.0)	27 (3.4)
Lithuania	43 (3.4)	501 (4.0)	505 (3.9)	23 (2.8)	31 (3.2)	30 (3.0)	30 (3.0)
Hungary	42 (3.4)	496 (5.8)	511 (3.6)	18 (3.0)	28 (3.3)	18 (2.9)	24 (3.0)
Ukraine	42 (4.1)	481 (5.9)	479 (5.4)	32 (4.1)	32 (4.5)	27 (4.1)	34 (4.3)
Sweden	r 40 (3.7)	483 (3.4)	488 (2.9)	r 16 (2.8)	r 15 (2.5)	r 15 (2.7)	r 26 (3.3)
Israel	34 (3.4)	526 (7.8)	516 (5.3)	20 (2.8)	22 (2.8)	21 (3.0)	23 (3.0)
Turkey	32 (3.1)	458 (10.6)	450 (3.8)	24 (2.6)	26 (2.7)	22 (2.6)	21 (2.7)
Italy	31 (3.9)	501 (5.2)	496 (3.2)	18 (2.8)	24 (3.6)	20 (3.1)	23 (3.4)
Slovenia	31 (2.5)	503 (3.8)	506 (2.9)	17 (2.3)	17 (2.2)	13 (1.8)	22 (2.5)
New Zealand	29 (3.4)	482 (7.3)	491 (6.6)	17 (2.9)	16 (3.0)	16 (2.7)	18 (3.1)
United Arab Emirates	29 (2.1)	447 (4.1)	459 (3.0)	25 (2.0)	25 (1.8)	21 (1.8)	26 (1.9)
Romania	29 (4.0)	469 (10.4)	455 (5.3)	25 (3.9)	24 (3.9)	22 (3.8)	25 (3.9)
Armenia	29 (3.7)	473 (7.2)	464 (4.0)	22 (3.1)	25 (3.5)	24 (3.3)	23 (3.3)
Bahrain	28 (2.8)	397 (3.3)	418 (3.0)	21 (2.6)	27 (2.7)	24 (3.0)	25 (2.7)
Palestinian Nat'l Auth.	27 (3.8)	409 (9.6)	402 (4.0)	19 (3.2)	25 (3.6)	18 (3.3)	21 (3.3)
Hong Kong SAR	24 (4.3)	587 (12.4)	585 (4.7)	14 (3.4)	15 (3.4)	14 (3.4)	10 (2.8)
Chinese Taipei	23 (3.4)	611 (6.6)	609 (4.3)	8 (2.1)	6 (1.7)	5 (1.5)	4 (1.6)
Syrian Arab Republic	22 (3.3)	386 (10.3)	377 (4.7)	12 (3.0)	12 (2.9)	13 (2.9)	14 (3.1)
Iran, Islamic Rep. of	22 (2.9)	460 (9.7)	402 (4.0)	13 (2.2)	12 (2.2)	11 (2.7)	11 (2.0)
Thailand	22 (3.6)	426 (11.8)	427 (5.0)	14 (2.8)	20 (3.6)	12 (2.5)	19 (3.5)
Oman	21 (2.7)	359 (8.4)	369 (3.4)	14 (2.6)	18 (2.6)	12 (2.2)	16 (2.7)
Saudi Arabia	21 (3.1)	408 (10.8)	393 (5.1)	15 (3.3)	18 (3.3)	15 (2.8)	17 (2.8)
Indonesia	20 (4.1)	375 (6.6)	388 (5.5)	5 (2.2)	7 (2.7)	5 (2.2)	6 (2.3)
Ghana	15 (3.1)	331 (11.1)	331 (4.9)	6 (2.1)	6 (2.1)	6 (2.2)	6 (2.1)
Lebanon	9 (2.3)	478 (15.3)	446 (3.7)	6 (1.9)	8 (2.2)	7 (2.0)	8 (2.4)
Morocco	7 (1.4)	383 (10.4)	369 (2.3)	3 (0.9)	3 (0.8)	2 (0.8)	3 (0.9)
Malaysia	6 (1.8)	434 (27.9)	442 (5.5)	5 (1.8)	5 (1.8)	4 (1.6)	4 (1.6)
Tunisia	5 (1.5)	418 (14.4)	426 (3.0)	2 (0.9)	2 (0.9)	2 (0.9)	2 (0.9)
International Avg.	36 (0.5)	470 (1.4)	467 (0.8)	22 (0.5)	23 (0.5)	21 (0.5)	24 (0.5)

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 8.30: Computer Activities During Mathematics Lessons (Continued)

TIMSS 2011 Mathematics 8th Grade

Country	Computers Available for Mathematics Lessons			Percent of Students Whose Teachers Have Them Use Computers At Least Monthly			
	Percent of Students	Average Achievement					
	Yes	Yes	No	To Explore Mathematics Principles and Concepts	To Look Up Ideas and Information	To Process and Analyze Data	To Practice Skills and Procedures
Ninth Grade Participants							
South Africa	20 (2.7)	363 (9.1)	349 (3.6)	7 (1.7)	8 (1.8)	7 (1.7)	6 (1.7)
Botswana	13 (3.1)	393 (5.3)	398 (2.9)	5 (2.0)	7 (2.3)	3 (1.4)	6 (2.2)
Honduras	r 8 (3.1)	340 (17.6)	336 (4.9)	r 2 (1.5)	r 7 (3.0)	r 2 (1.2)	r 5 (2.4)
Benchmarking Participants							
Florida, US	r 64 (6.3)	508 (9.2)	537 (11.7)	s 37 (6.2)	s 32 (6.7)	s 34 (6.3)	s 40 (6.6)
Alabama, US	r 61 (8.4)	463 (10.7)	473 (12.3)	r 38 (7.8)	r 26 (6.3)	r 27 (6.7)	r 39 (8.1)
Alberta, Canada	54 (3.9)	503 (3.6)	508 (3.4)	36 (3.8)	33 (3.7)	31 (4.0)	32 (4.0)
Ontario, Canada	52 (3.8)	510 (3.7)	516 (3.8)	37 (3.8)	35 (3.3)	36 (3.8)	37 (4.1)
North Carolina, US	r 50 (6.8)	545 (12.5)	531 (8.2)	r 30 (7.0)	r 24 (6.2)	r 29 (6.4)	r 36 (7.2)
Indiana, US	r 47 (7.2)	516 (8.3)	518 (7.7)	r 19 (5.5)	r 14 (4.5)	r 14 (4.1)	r 27 (6.4)
Colorado, US	r 45 (6.8)	524 (12.3)	515 (8.8)	r 29 (5.9)	r 23 (5.5)	r 27 (5.5)	r 32 (6.6)
Massachusetts, US	r 36 (7.6)	564 (14.9)	559 (7.2)	r 17 (3.9)	r 16 (4.9)	r 19 (5.6)	r 17 (5.0)
Connecticut, US	r 35 (4.6)	511 (8.7)	531 (8.2)	r 18 (4.4)	r 15 (3.8)	r 15 (4.1)	r 22 (4.4)
California, US	s 35 (7.0)	486 (12.5)	498 (7.0)	s 19 (7.4)	s 19 (6.8)	s 17 (7.1)	s 18 (7.3)
Dubai, UAE	34 (2.4)	474 (7.3)	476 (2.9)	30 (2.3)	30 (2.3)	27 (2.3)	31 (2.3)
Minnesota, US	r 30 (5.9)	537 (14.6)	549 (6.1)	r 19 (4.8)	r 13 (4.7)	r 15 (5.4)	r 22 (6.2)
Abu Dhabi, UAE	25 (3.7)	442 (8.1)	452 (4.9)	21 (3.4)	20 (3.4)	16 (3.0)	21 (3.6)
Quebec, Canada	22 (3.4)	538 (6.0)	532 (3.0)	12 (2.9)	12 (2.8)	9 (2.4)	13 (3.1)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 8.31: Weekly Time Students Spend on Mathematics Homework

TIMSS 2011 8th Grade Mathematics

Reported by Students

Country	3 Hours or More		More than 45 Minutes but Less than 3 Hours		45 Minutes or Less	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Romania	44 (1.8)	492 (4.4)	31 (1.1)	463 (4.7)	25 (1.4)	411 (4.4)
Russian Federation	36 (1.1)	531 (4.3)	50 (1.4)	546 (3.7)	14 (0.8)	540 (5.3)
Kazakhstan	34 (1.2)	486 (5.1)	45 (1.1)	495 (4.2)	21 (1.0)	481 (5.3)
Georgia	31 (1.5)	454 (5.4)	39 (1.0)	455 (4.2)	30 (1.4)	405 (5.0)
Ukraine	26 (1.3)	477 (5.4)	53 (1.1)	489 (3.7)	21 (1.1)	468 (5.9)
Italy	25 (1.1)	484 (3.6)	54 (1.1)	506 (2.7)	21 (1.1)	497 (3.8)
Armenia	24 (1.1)	481 (4.9)	42 (1.0)	476 (3.0)	34 (1.2)	456 (4.1)
Thailand	22 (1.3)	445 (8.3)	52 (1.1)	430 (4.2)	26 (1.2)	411 (4.7)
Tunisia	21 (1.1)	420 (3.6)	43 (0.9)	431 (3.2)	37 (1.3)	424 (3.5)
Malaysia	20 (1.0)	441 (5.4)	46 (1.0)	447 (6.3)	34 (1.1)	432 (6.4)
Lebanon	19 (1.2)	447 (5.2)	36 (1.2)	456 (4.7)	45 (1.7)	447 (4.5)
Morocco	18 (0.6)	388 (3.4)	34 (0.6)	389 (2.8)	48 (1.0)	363 (2.8)
Hong Kong SAR	17 (1.5)	607 (4.7)	45 (1.4)	599 (4.2)	38 (2.1)	564 (5.8)
Chinese Taipei	17 (1.0)	621 (6.9)	45 (1.0)	626 (3.5)	38 (1.4)	589 (3.8)
Israel	17 (0.8)	544 (5.4)	42 (0.8)	527 (4.3)	41 (1.2)	501 (5.2)
Slovenia	16 (1.1)	498 (3.8)	45 (1.0)	508 (2.3)	38 (1.3)	505 (3.3)
Macedonia, Rep. of	16 (1.0)	432 (7.4)	40 (1.2)	450 (5.1)	44 (1.5)	416 (6.4)
Singapore	16 (0.7)	628 (4.8)	57 (0.9)	622 (3.1)	27 (1.2)	584 (5.7)
Lithuania	16 (0.9)	490 (4.4)	44 (1.0)	508 (2.8)	40 (1.4)	506 (3.3)
Syrian Arab Republic	16 (0.7)	385 (5.3)	37 (1.1)	400 (4.4)	47 (1.3)	368 (5.4)
United States	15 (1.0)	535 (4.1)	42 (0.9)	519 (3.0)	43 (1.3)	496 (2.7)
Indonesia	13 (0.8)	401 (5.1)	45 (1.1)	404 (4.3)	42 (1.4)	371 (5.7)
Palestinian Nat'l Auth.	13 (0.8)	383 (6.1)	30 (1.2)	409 (4.0)	57 (1.4)	412 (4.0)
Ghana	12 (0.8)	328 (5.2)	41 (1.2)	348 (5.0)	46 (1.4)	324 (4.6)
Bahrain	12 (0.8)	383 (7.6)	31 (1.0)	427 (3.7)	57 (1.4)	410 (2.7)
Jordan	12 (0.6)	405 (5.3)	36 (0.9)	419 (3.8)	52 (1.2)	409 (3.9)
Iran, Islamic Rep. of	11 (0.6)	422 (9.4)	48 (0.9)	426 (5.0)	41 (1.0)	402 (4.2)
Hungary	10 (0.8)	492 (7.2)	36 (0.9)	511 (3.6)	54 (1.3)	507 (4.0)
Qatar	9 (0.9)	430 (10.1)	31 (0.7)	443 (4.6)	60 (1.1)	392 (3.4)
United Arab Emirates	9 (0.5)	455 (5.3)	31 (0.7)	469 (2.7)	60 (1.0)	452 (2.0)
Norway	9 (0.8)	460 (4.9)	51 (1.3)	479 (2.4)	40 (1.7)	476 (3.3)
Turkey	8 (0.5)	440 (5.8)	40 (1.1)	459 (4.2)	52 (1.2)	456 (4.8)
Australia	7 (0.7)	535 (13.6)	35 (1.5)	529 (5.8)	59 (1.6)	491 (5.2)
Oman	6 (0.4)	349 (6.9)	20 (0.7)	372 (4.1)	74 (0.9)	373 (2.8)
Saudi Arabia	5 (0.5)	356 (7.9)	18 (0.7)	391 (5.6)	77 (1.0)	398 (4.9)
New Zealand	4 (0.7)	508 (8.8)	27 (1.7)	518 (5.9)	69 (2.2)	482 (5.1)
Chile	4 (0.4)	403 (7.0)	28 (1.0)	417 (3.2)	68 (1.2)	419 (2.8)
Japan	3 (0.4)	586 (15.2)	20 (1.6)	567 (3.9)	77 (1.8)	571 (2.9)
Korea, Rep. of	2 (0.4)	~ ~	20 (1.1)	611 (4.7)	78 (1.4)	615 (3.0)
Sweden	2 (0.3)	~ ~	23 (1.3)	484 (3.1)	75 (1.4)	491 (1.9)
Finland	2 (0.2)	~ ~	23 (1.0)	508 (3.5)	76 (1.1)	518 (2.6)
England	1 (0.2)	~ ~	25 (1.4)	536 (6.7)	74 (1.5)	500 (5.5)
International Avg.	15 (0.1)	464 (1.1)	38 (0.2)	478 (0.6)	48 (0.2)	460 (0.7)

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (–) indicates comparable data not available. A tilde (~) indicates insufficient data to report achievement.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 8.31: Weekly Time Students Spend on Mathematics Homework (Continued)

Country	3 Hours or More		More than 45 Minutes but Less than 3 Hours		45 Minutes or Less	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Ninth Grade Participants						
South Africa	26 (0.7)	354 (3.6)	43 (0.7)	370 (2.7)	31 (0.9)	337 (2.9)
Botswana	21 (0.9)	394 (3.2)	43 (0.9)	414 (3.2)	36 (1.2)	384 (3.1)
Honduras	– –	– –	– –	– –	– –	– –
Benchmarking Participants						
California, US	27 (2.4)	519 (7.4)	43 (2.0)	499 (5.4)	31 (2.3)	466 (6.8)
Massachusetts, US	24 (2.6)	578 (7.7)	49 (1.9)	563 (5.1)	27 (2.8)	544 (6.8)
Minnesota, US	21 (1.9)	556 (5.0)	49 (1.4)	554 (5.8)	30 (2.1)	528 (5.0)
North Carolina, US	19 (2.9)	587 (8.3)	43 (2.4)	546 (7.9)	38 (3.3)	506 (7.4)
Indiana, US	19 (2.2)	551 (7.6)	46 (1.5)	529 (4.6)	36 (2.2)	501 (5.9)
Connecticut, US	17 (2.0)	558 (9.4)	47 (1.5)	529 (4.8)	35 (2.1)	492 (5.4)
Quebec, Canada	16 (1.1)	524 (3.8)	48 (1.3)	539 (2.7)	35 (1.9)	530 (3.1)
Colorado, US	14 (1.3)	545 (8.2)	43 (2.2)	526 (5.1)	43 (2.5)	503 (7.1)
Florida, US	14 (1.9)	543 (7.6)	41 (2.5)	528 (7.8)	45 (3.3)	497 (7.1)
Ontario, Canada	13 (1.1)	511 (5.3)	43 (1.5)	512 (3.1)	44 (1.8)	512 (3.2)
Dubai, UAE	11 (0.7)	478 (5.6)	38 (1.1)	492 (3.3)	51 (1.4)	470 (2.5)
Alberta, Canada	10 (0.9)	499 (5.2)	37 (1.5)	503 (3.4)	53 (1.9)	510 (3.2)
Abu Dhabi, UAE	9 (0.7)	449 (8.1)	29 (1.4)	459 (6.2)	62 (1.9)	446 (3.7)
Alabama, US	9 (1.7)	511 (13.0)	33 (2.1)	480 (7.3)	58 (3.1)	456 (5.2)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

A. How often does your teacher give you homework in mathematics?

1) Every day
2) 3 or 4 times a week
3) 1 or 2 times a week
4) Less than once a week
5) Never

B. When your teacher gives you mathematics homework, about how many minutes do you usually spend on your homework?

1) My teacher never gives me homework
2) 1-15 minutes
3) 16-30 minutes
4) 31-60 minutes
5) 61-90 minutes
6) More than 90 minutes

The weekly time spent on mathematics homework was calculated by multiplying how often students were given homework weekly by the minutes they spent on that homework.

The values for Part A were: Every day = 5; 3 or 4 times a week = 3.5; 1 or 2 times a week = 1.5; Less than once a week = 0.5; and Never = 0.

The values for Part B were: My teacher never gives me homework = 0; 1-15 minutes = 8; 16-30 minutes = 23; 31-60 minutes = 45; 61-90 minutes = 75; and More than 90 minutes = 105.

Exhibit 8.32: Classroom Assessment

Reported by Teachers

Country	Percentage of Students Whose Teachers Give Mathematics Tests or Examinations			Percentage of Students Whose Teachers Give Test Questions								
				Involving Application of Mathematical Procedures			Involving Searching for Patterns and Relationships			Requiring Explanations or Justifications		
	Every 2 Weeks or More	About Once a Month	A Few Times a Year or Less	Always or Almost Always	Sometimes	Never or Almost Never	Always or Almost Always	Sometimes	Never or Almost Never	Always or Almost Always	Sometimes	Never or Almost Never
Armenia	40 (3.0)	41 (3.2)	19 (2.9)	59 (3.4)	40 (3.4)	0 (0.0)	20 (2.7)	74 (3.1)	6 (1.9)	55 (3.9)	44 (3.9)	1 (0.9)
Australia	r 16 (2.7)	66 (4.2)	18 (3.4)	r 84 (2.8)	16 (2.8)	0 (0.1)	s 30 (4.6)	66 (4.4)	3 (1.5)	r 37 (4.3)	52 (3.9)	11 (2.7)
Bahrain	80 (2.9)	18 (2.8)	1 (0.7)	69 (3.3)	31 (3.3)	0 (0.0)	23 (2.4)	74 (2.6)	3 (0.9)	27 (3.3)	71 (3.4)	2 (0.8)
Chile	68 (4.0)	31 (3.9)	1 (1.0)	92 (2.0)	7 (2.0)	0 (0.4)	36 (4.1)	57 (4.2)	8 (2.3)	48 (4.0)	47 (3.8)	6 (2.3)
Chinese Taipei	98 (1.3)	2 (1.1)	1 (0.6)	57 (4.0)	42 (3.9)	1 (0.7)	46 (4.2)	53 (4.1)	1 (0.7)	20 (3.4)	74 (3.6)	6 (1.6)
England	9 (2.2)	31 (3.2)	60 (4.0)	71 (4.0)	28 (3.8)	1 (1.0)	38 (4.3)	59 (4.3)	3 (1.1)	45 (4.3)	51 (4.4)	4 (1.5)
Finland	1 (0.6)	44 (3.7)	55 (3.7)	82 (2.7)	17 (2.7)	1 (0.4)	35 (3.4)	59 (3.6)	5 (1.6)	45 (3.7)	49 (3.8)	6 (1.5)
Georgia	46 (3.6)	47 (3.5)	7 (1.7)	93 (2.0)	7 (2.0)	0 (0.0)	20 (2.8)	78 (3.0)	2 (1.1)	47 (3.8)	50 (3.9)	3 (0.8)
Ghana	70 (4.0)	29 (3.9)	1 (0.9)	73 (4.3)	27 (4.3)	0 (0.0)	25 (3.7)	73 (3.8)	2 (1.2)	32 (4.0)	66 (4.2)	2 (1.2)
Hong Kong SAR	56 (4.6)	39 (4.5)	5 (2.0)	66 (4.7)	34 (4.7)	0 (0.0)	19 (3.3)	68 (4.1)	13 (3.0)	19 (3.5)	74 (3.7)	7 (2.3)
Hungary	69 (3.4)	29 (3.3)	1 (0.9)	90 (1.8)	10 (1.8)	0 (0.0)	56 (3.1)	43 (3.1)	1 (0.3)	6 (1.5)	72 (3.1)	22 (3.0)
Indonesia	38 (4.5)	54 (4.5)	8 (2.3)	65 (4.7)	35 (4.7)	0 (0.0)	34 (4.1)	60 (4.6)	6 (2.1)	38 (4.6)	55 (4.3)	7 (2.3)
Iran, Islamic Rep. of	35 (3.1)	51 (3.0)	14 (2.5)	61 (3.3)	38 (3.3)	1 (0.4)	27 (2.9)	64 (3.1)	9 (1.8)	23 (2.6)	66 (2.9)	11 (2.2)
Israel	20 (2.2)	54 (2.9)	26 (2.8)	76 (2.6)	24 (2.6)	0 (0.2)	39 (3.0)	56 (2.8)	5 (1.2)	66 (2.8)	30 (2.8)	4 (1.3)
Italy	32 (3.5)	65 (3.6)	4 (1.6)	90 (2.4)	9 (2.4)	0 (0.0)	27 (3.5)	64 (3.4)	9 (2.7)	40 (3.8)	53 (4.0)	7 (2.0)
Japan	15 (2.8)	44 (3.9)	41 (4.1)	66 (3.7)	33 (3.8)	1 (0.9)	35 (3.9)	55 (4.2)	10 (2.2)	30 (4.0)	68 (4.1)	2 (1.0)
Jordan	48 (3.6)	49 (3.6)	3 (1.0)	76 (3.5)	23 (3.4)	1 (0.6)	26 (3.3)	69 (3.7)	5 (2.0)	33 (3.8)	60 (3.6)	8 (2.1)
Kazakhstan	85 (2.7)	10 (2.2)	5 (1.8)	82 (3.5)	18 (3.5)	0 (0.0)	56 (3.8)	42 (3.8)	3 (1.5)	51 (4.6)	47 (4.5)	2 (1.0)
Korea, Rep. of	46 (2.8)	42 (2.7)	12 (2.1)	71 (2.6)	29 (2.6)	1 (0.5)	43 (3.5)	54 (3.7)	2 (1.0)	24 (2.6)	67 (2.7)	8 (1.8)
Lebanon	81 (3.0)	19 (3.0)	0 (0.0)	82 (3.3)	18 (3.3)	0 (0.0)	41 (4.1)	55 (4.2)	5 (1.8)	70 (3.8)	30 (3.8)	0 (0.0)
Lithuania	76 (3.1)	24 (3.1)	0 (0.0)	89 (1.9)	11 (1.9)	0 (0.0)	34 (3.6)	64 (3.6)	1 (0.6)	45 (3.9)	52 (3.9)	3 (1.0)
Macedonia, Rep. of	r 25 (3.7)	43 (3.8)	32 (3.7)	s 78 (3.8)	22 (3.8)	0 (0.0)	s 49 (4.4)	48 (4.7)	3 (1.2)	s 39 (4.5)	54 (4.7)	7 (2.5)
Malaysia	10 (1.7)	43 (3.3)	47 (3.5)	58 (3.8)	42 (3.8)	0 (0.0)	26 (3.6)	71 (3.7)	2 (1.2)	11 (2.6)	71 (3.4)	18 (3.0)
Morocco	18 (2.7)	77 (2.9)	6 (1.7)	85 (2.7)	14 (2.6)	1 (0.8)	25 (2.6)	68 (2.7)	7 (1.5)	42 (3.4)	52 (3.0)	6 (1.7)
New Zealand	17 (3.1)	65 (4.0)	18 (3.0)	71 (3.5)	28 (3.5)	1 (0.4)	30 (3.7)	68 (3.8)	3 (0.7)	33 (4.0)	59 (4.7)	8 (2.1)
Norway	7 (2.2)	75 (3.5)	18 (3.0)	71 (3.8)	28 (3.8)	0 (0.4)	12 (2.8)	82 (3.2)	5 (1.6)	32 (3.8)	65 (3.6)	3 (1.5)
Oman	23 (2.5)	61 (3.3)	16 (2.6)	80 (2.5)	20 (2.5)	0 (0.0)	16 (2.4)	77 (2.7)	7 (1.4)	13 (1.8)	67 (2.7)	20 (2.3)
Palestinian Nat'l Auth.	63 (3.2)	37 (3.2)	0 (0.0)	74 (3.6)	25 (3.5)	1 (0.0)	20 (3.4)	71 (3.6)	9 (2.3)	22 (3.5)	67 (3.7)	10 (2.7)
Qatar	84 (2.5)	14 (2.2)	2 (1.2)	84 (2.7)	15 (2.6)	1 (0.7)	30 (2.5)	67 (2.7)	3 (1.1)	36 (4.2)	62 (4.3)	2 (0.9)
Romania	63 (4.0)	36 (3.9)	1 (0.9)	89 (2.5)	11 (2.5)	0 (0.4)	44 (4.1)	53 (4.2)	3 (1.2)	75 (3.1)	24 (3.1)	1 (0.9)
Russian Federation	97 (1.3)	3 (1.2)	0 (0.0)	74 (3.1)	26 (3.0)	1 (0.6)	33 (3.6)	64 (3.5)	3 (1.1)	48 (4.1)	50 (4.1)	2 (1.0)
Saudi Arabia	65 (4.0)	32 (4.0)	2 (1.2)	72 (3.5)	26 (3.4)	1 (1.0)	39 (4.2)	57 (4.2)	4 (1.7)	25 (3.6)	66 (4.0)	10 (2.6)
Singapore	39 (2.4)	51 (2.6)	10 (1.4)	76 (2.1)	24 (2.1)	0 (0.0)	16 (1.7)	76 (2.3)	8 (1.7)	10 (1.5)	67 (2.9)	23 (2.3)
Slovenia	2 (0.6)	10 (1.8)	88 (1.9)	91 (1.8)	9 (1.8)	0 (0.0)	23 (2.9)	69 (2.9)	8 (1.3)	16 (2.3)	60 (2.6)	25 (2.5)
Sweden	r 0 (0.4)	36 (3.5)	64 (3.5)	r 81 (2.9)	18 (2.7)	1 (0.9)	r 19 (2.6)	76 (2.9)	5 (1.4)	r 80 (3.0)	20 (3.1)	0 (0.3)
Syrian Arab Republic	25 (4.0)	50 (4.4)	25 (4.1)	64 (4.1)	36 (4.1)	0 (0.0)	29 (3.9)	65 (4.2)	6 (2.1)	27 (4.1)	60 (4.4)	14 (3.3)
Thailand	55 (4.1)	39 (3.9)	6 (1.8)	55 (4.3)	44 (4.4)	1 (0.8)	32 (4.1)	67 (4.1)	1 (0.0)	45 (3.7)	52 (3.8)	3 (1.1)
Tunisia	3 (1.1)	84 (2.7)	13 (2.5)	90 (2.4)	10 (2.4)	0 (0.0)	25 (3.1)	66 (3.0)	9 (2.1)	43 (3.5)	56 (3.6)	1 (0.7)
Turkey	24 (2.8)	70 (3.1)	6 (1.5)	91 (2.0)	9 (2.0)	0 (0.4)	41 (3.4)	58 (3.3)	1 (0.8)	18 (2.8)	62 (3.2)	20 (2.2)
Ukraine	88 (3.0)	11 (2.9)	1 (0.0)	77 (3.7)	21 (3.5)	2 (1.1)	39 (4.4)	59 (4.4)	2 (1.5)	72 (3.9)	27 (4.0)	1 (0.0)
United Arab Emirates	73 (1.8)	25 (1.8)	3 (0.4)	78 (2.1)	21 (2.1)	1 (0.2)	28 (2.4)	67 (2.4)	5 (1.4)	29 (2.3)	64 (2.3)	7 (1.4)
United States	r 77 (2.2)	22 (2.2)	1 (0.5)	r 83 (1.7)	17 (1.6)	0 (0.4)	r 32 (2.4)	62 (2.4)	7 (1.3)	r 35 (2.4)	53 (2.6)	12 (1.8)
International Avg.	45 (0.5)	40 (0.5)	15 (0.3)	77 (0.5)	23 (0.5)	0 (0.1)	31 (0.5)	64 (0.6)	5 (0.2)	37 (0.5)	56 (0.6)	8 (0.3)

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 8.32: Classroom Assessment (Continued)

TIMSS 2011 Mathematics 8th Grade

Country	Percentage of Students Whose Teachers Give Mathematics Tests or Examinations			Percentage of Students Whose Teachers Give Test Questions								
				Involving Application of Mathematical Procedures			Involving Searching for Patterns and Relationships			Requiring Explanations or Justifications		
	Every 2 Weeks or More	About Once a Month	A Few Times a Year or Less	Always or Almost Always	Sometimes	Never or Almost Never	Always or Almost Always	Sometimes	Never or Almost Never	Always or Almost Always	Sometimes	Never or Almost Never
Ninth Grade Participants												
Botswana	16 (3.1)	84 (3.2)	1 (0.0)	83 (3.6)	16 (3.6)	1 (0.0)	42 (4.1)	57 (4.3)	1 (1.1)	24 (3.6)	70 (3.9)	6 (2.2)
Honduras	65 (4.3)	31 (4.5)	3 (1.5)	r 74 (3.9)	24 (4.4)	2 (1.5)	r 19 (3.9)	69 (4.4)	11 (2.4)	r 33 (4.7)	58 (5.4)	9 (3.1)
South Africa	31 (3.8)	61 (3.9)	8 (2.1)	76 (3.3)	23 (3.3)	1 (0.9)	33 (3.9)	67 (3.9)	0 (0.0)	31 (2.8)	66 (3.0)	3 (1.1)
Benchmarking Participants												
Alberta, Canada	72 (3.6)	26 (3.4)	2 (1.2)	77 (3.4)	23 (3.4)	0 (0.0)	38 (3.8)	60 (3.7)	2 (1.1)	52 (3.8)	43 (4.1)	5 (1.6)
Ontario, Canada	74 (3.7)	24 (3.7)	2 (1.0)	85 (2.6)	15 (2.6)	0 (0.0)	35 (3.8)	64 (3.9)	1 (0.6)	66 (3.5)	32 (3.3)	2 (1.6)
Quebec, Canada	71 (3.6)	29 (3.7)	0 (0.1)	93 (2.0)	6 (1.8)	1 (0.9)	19 (3.0)	64 (3.7)	17 (2.9)	45 (4.4)	51 (4.6)	4 (1.9)
Abu Dhabi, UAE	82 (2.8)	17 (2.7)	1 (0.6)	82 (3.5)	18 (3.4)	1 (0.0)	32 (4.3)	63 (4.3)	5 (3.0)	29 (4.3)	63 (4.5)	8 (2.8)
Dubai, UAE	62 (3.8)	31 (3.8)	7 (0.7)	79 (2.7)	20 (2.7)	1 (0.0)	23 (1.9)	69 (3.2)	8 (2.7)	39 (3.6)	56 (3.9)	5 (1.4)
Alabama, US	r 95 (3.7)	5 (3.7)	0 (0.0)	r 85 (4.1)	15 (4.1)	0 (0.0)	r 12 (4.2)	77 (5.6)	11 (3.8)	r 36 (6.6)	55 (7.0)	9 (3.9)
California, US	s 80 (5.5)	18 (5.2)	2 (0.2)	s 82 (4.0)	15 (4.5)	3 (0.2)	s 25 (5.1)	56 (7.0)	19 (5.5)	s 32 (5.5)	42 (6.5)	26 (4.8)
Colorado, US	r 81 (5.2)	19 (5.2)	0 (0.0)	r 79 (4.4)	21 (4.4)	0 (0.0)	r 36 (5.7)	60 (5.6)	4 (2.7)	r 54 (6.1)	44 (6.1)	2 (0.2)
Connecticut, US	r 74 (5.6)	26 (5.6)	0 (0.0)	r 88 (3.8)	12 (3.8)	0 (0.0)	r 20 (5.1)	76 (5.2)	4 (1.6)	r 52 (6.2)	44 (6.0)	3 (1.8)
Florida, US	s 77 (5.0)	21 (4.9)	2 (1.4)	s 86 (4.4)	14 (4.4)	0 (0.0)	s 33 (6.9)	58 (6.9)	9 (4.6)	s 38 (6.7)	54 (7.0)	9 (3.6)
Indiana, US	r 73 (4.8)	26 (4.7)	1 (0.0)	r 75 (6.4)	25 (6.4)	0 (0.0)	r 18 (4.9)	69 (5.8)	13 (5.1)	r 25 (5.3)	66 (6.4)	9 (4.4)
Massachusetts, US	r 79 (5.3)	21 (5.3)	0 (0.0)	r 88 (3.4)	12 (3.4)	0 (0.0)	r 40 (7.3)	58 (7.7)	1 (1.5)	r 63 (6.2)	35 (6.1)	2 (0.1)
Minnesota, US	r 81 (4.7)	19 (4.7)	0 (0.0)	r 84 (4.6)	16 (4.6)	0 (0.0)	r 32 (6.2)	68 (6.2)	1 (0.0)	r 35 (6.5)	63 (6.5)	1 (1.2)
North Carolina, US	r 88 (4.0)	12 (4.0)	0 (0.0)	s 90 (4.5)	10 (4.5)	0 (0.0)	r 34 (6.4)	65 (6.6)	1 (0.9)	r 33 (6.4)	56 (6.7)	11 (4.7)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

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Appendices



Appendix A

Countries Participating in TIMSS 2011 and in Earlier TIMSS Assessments

Appendix A.1: Countries Participating in TIMSS 2011 and in Earlier TIMSS Assessments

TIMSS 2011 4th & 8th Grades Mathematics

Country	Grade 4				Grade 8				
	2011	2007	2003	1995	2011	2007	2003	1999	1995
Armenia	●	○	●		●	○	●		
Australia	●	●	●	●	●	●	●	○	●
Austria	●	●		●					●
Azerbaijan	●								
Bahrain	●				●	●	●		
Belgium (Flemish)	●		●				●	●	●
Botswana						●	●		
Chile	●				●		●	●	
Chinese Taipei	●	●	●		●	●	●	●	
Croatia	●								
Czech Republic	●	●		●		●		●	●
Denmark	●	●							●
England	●	●	●	●	●	●	●	●	●
[1] Finland	●				●			○	
Georgia	●	●			●	●			
Germany	●	●							●
Ghana					●	●	●		
Hong Kong SAR	●	●	●	●	●	●	●	●	●
Hungary	●	●	●	●	●	●	●	●	●
Indonesia				○	●	●	○	○	○
Iran, Islamic Rep. of	●	●	●	●	●	●	●	●	●
Ireland	●			●					●
Israel				●	●	○	○	○	○
Italy	●	●	●	○	●	●	●	●	○
Japan	●	●	●	●	●	●	●	●	●
Jordan					●	●	●	●	
Kazakhstan	●	○			●				
Korea, Rep. of	●			●	●	●	●	●	●
Kuwait	●	○		○		○			○
Lebanon					●	●	●		
Lithuania	●	●	●		●	●	●	●	●
Macedonia, Rep. of					●		●	●	
Malaysia					●	●	●	●	
Malta	●					●			
Morocco	●	●	●		●	○	○	○	
Netherlands	●	●	●	●			●	●	●
New Zealand	●	●	●	●	●		●	●	●
Northern Ireland	●								
Norway	●	●	●	●	●	●	●		●
Oman	●				●	●			
Palestinian Nat'l Auth.					●	●	●		
Poland	●								
Portugal	●			●					●
Qatar	●	○			●	○			
Romania	●				●	●	●	●	●
Russian Federation	●	●	●		●	●	●	●	●
Saudi Arabia	●				●	○	○		
Serbia	●					●	●		
Singapore	●	●	●	●	●	●	●	●	●
Slovak Republic	●	●					●	●	●
Slovenia	●	●	●	●	●	●	●	○	●
South Africa							●	●	○
Spain	●								●
Sweden	●	●			●	●	●		●
Syrian Arab Republic					●	●	○		
Thailand	●			○	●	●		●	○
Tunisia	●	●	●		●	●	●	●	
Turkey	●				●	○		○	
Ukraine		●			●	●			
United Arab Emirates	●				●				
United States	●	●	●	●	●	●	●	●	●
Yemen	●	●	○						

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

● Indicates participation in that testing cycle.

○ Indicates participation but data not comparable for measuring trends to 2011, primarily due to countries improving translations or increasing population coverage.

1 Finland assessed their fourth and eighth grade students in 2011. Also, to measure trends from their 1999 seventh grade results, Finland assessed their seventh grade students in 2011 as well.

TIMSS & PIRLS International Study Center
Lynch School of Education, Boston College

Appendix A.1: Countries Participating in TIMSS 2011 and in Earlier TIMSS Assessments (Continued)

TIMSS 2011 Mathematics 4th & 8th Grades

Country	Grade 4				Grade 8				
	2011	2007	2003	1995	2011	2007	2003	1999	1995
Out of Grade Participants									
Botswana (6,9)	●				●				
Honduras (6,9)	●				●				
South Africa (9)					●				
Yemen (6)	●								
Benchmarking Participants									
Alberta, Canada	●	●		●	●			●	●
Ontario, Canada	●	●	●	●	●	●	●	●	●
Quebec, Canada	●	●	●	●	●	●	●	●	●
Abu Dhabi, UAE	●				●				
Dubai, UAE	●	●			●	●			
Alabama, US					●				
California, US					●				
Colorado, US				●	●				
Connecticut, US					●			●	
Florida, US	●				●				
Indiana, US			●		●		●	●	
Massachusetts, US		●			●	●		●	
Minnesota, US		●		●	●	●			●
North Carolina, US	●				●			●	

● Indicates participation in that testing cycle.

○ Indicates participation but data not comparable for measuring trends to 2011, primarily due to countries improving translations or increasing population coverage.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Appendix B

Characteristics of the Items in the TIMSS 2011 Mathematics Assessment

Appendix B.1: Distribution of Assessment Items by Content Domain, Cognitive Domain, and Item Format

TIMSS 2011 Mathematics 4th Grade

TIMSS Assessment Items	Multiple-choice Items	Constructed-response Items	Total Items	Percentage of Score Points
Content Domain				
Number	42 (42)	46 (50)	88 (92)	50%
Geometric Shapes and Measures	38 (38)	23 (27)	61 (65)	35%
Data Display	13 (13)	13 (15)	26 (28)	15%
Total	93 (93)	82 (92)	175 (185)	100%
Percentage of Score Points	50%	50%		
Cognitive Domain				
Knowing	43 (43)	27 (30)	70 (73)	39%
Applying	34 (34)	37 (41)	71 (75)	41%
Reasoning	16 (16)	18 (21)	34 (37)	20%
Total	93 (93)	82 (92)	175 (185)	100%
Percentage of Score Points	50%	50%		

Score points are shown in parentheses.
Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Appendix B.2: Distribution of Assessment Items by Content Domain, Cognitive Domain, and Item Format

TIMSS Assessment Items	Multiple-choice Items	Constructed-response Items	Total Items	Percentage of Score Points
Content Domain				
Number	31 (31)	30 (36)	61 (67)	29%
Algebra	37 (37)	33 (39)	70 (76)	33%
Geometry	25 (25)	18 (19)	43 (44)	19%
Data and Chance	25 (25)	18 (20)	43 (45)	19%
Total	118 (118)	99 (114)	217 (232)	100%
Percentage of Score Points	51%	49%		
Cognitive Domain				
Knowing	53 (53)	27 (30)	80 (83)	36%
Applying	47 (47)	38 (44)	85 (91)	39%
Reasoning	18 (18)	34 (40)	52 (58)	25%
Total	118 (118)	99 (114)	217 (232)	100%
Percentage of Score Points	51%	49%		

Score points are shown in parentheses.
Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Appendix C

Population Coverage and Sample Participation Rates

Appendix C.1: Information about the Students Assessed in TIMSS 2011

TIMSS 2011 4th & 8th Grades Mathematics

Reported by National Research Coordinators

Country	Grade 4		Grade 8		Information About Age of Entry, Promotion, and Retention
	Country's Name for Fourth Year of Formal Schooling*	Average Age at Time of Testing	Country's Name for Eighth Year of Formal Schooling*	Average Age at Time of Testing	
Armenia	Grade 4	10.0	Grade 8	14.6	Children must be 6 years old to begin school the following December 31st. The age of entry policy has changed within the past ten years. Promotion is automatic for Grades 1–5, but dependent on academic progress for Grades 6–8.
Australia	Year 4	10.0	Year 8	14.0	Varies by state, but children generally must begin school by age 6. Most children actually begin school at the minimum age of 4.5–5, and the age of entry policy has been revised within the past ten years. Policy on promotion and retention varies by state but, generally, there is automatic promotion for Grades 1–8.
Austria	Grade 4	10.3			Children must begin school in the September following their 6th birthday, but parents can request early admission for children who turn 6 by March 1st of the following year. Automatic promotion for Grade 1, but there is retention in Grades 2–4 for students failing one or more compulsory subjects.
Azerbaijan	Grade 4	10.2			Children must be 6 years old by the end of September to begin school on September 15 of that year, but children the Ministry of Education identifies as talented who are born before the end of November can begin school in September of the year they turn 6. Promotion is automatic for Grades 1–4, but is dependent on academic progress for Grades 5–8.
Bahrain	Grade 5	10.4	3rd Intermediate	14.4	Parents must register their children at school when they are 7 years old. Children must be 6 years old by the end of June to begin the following September. The age of entry policy has changed within the past ten years. Promotion is dependent upon passing Arabic, Mathematics, Science, and English.
Belgium (Flemish)	Grade 4	10.0			Children must begin school on September 1st of the year of their 6th birthday. Parents can keep their child in kindergarten until age 7, with approval. Promotion is decided by each school and/or parents; students not having fully attended preprimary education must pass a language qualification test to begin primary school.
Chile	Grade 4	10.1	Grade 8	14.2	Compulsory schooling begins at age 6. Children must be 6 years old by March 31st to begin in March of the same calendar year. Promotion is dependent on academic progress for all grades.
Chinese Taipei	Grade 4	10.2	Grade 8	14.2	Children must be 6 years old before September 1st to begin school in the September of the same calendar year. There is automatic promotion for Grades 1–8.
Croatia	Grade 4	10.7			The age of entry policy, which has changed within the past ten years, says that all children must begin school by 7 years old. Although children must be at least 6 years old by the end of March to begin the following September, children typically begin school at age 7. Student promotion is dependent on meeting minimum standards in Grades 1–8.
Czech Republic	Grade 4	10.4			Compulsory schooling begins at the beginning of the school year (September 1st) following the child's 6th birthday unless granted a postponement, which an increasing number of parents are seeking. Promotion is dependent on academic progress in all compulsory subjects, but is automatic for students who have repeated a year.
Denmark	Grade 4	11.0			Children begin preprimary education the year they turn 6 and primary education the following year. Delaying entry by a year requires municipal board approval, but parents can have their child begin a year early. This policy has changed within the past ten years. There is automatic promotion in Grades 1–8, though in special cases students may be promoted or retained based on individual assessments, with parental consent.
England	Year 5	10.2	Year 9	14.2	Children begin school the term (typically September, January, or April) of their 5th birthday. Many local authorities make provision for all children to begin in the September of the school year in which they will turn 5 and some have changed the discretionary time so that children can begin at a younger age, although all of this is subject to parental discretion. There is no policy on promotion and retention.
Finland	Grade 4	10.8	Grade 8	14.8	Children begin school the autumn of the year of their 7th birthday, although it is possible to enter school either one year earlier or one year later than the official policy, following discussions with an expert (e.g., school psychologist). There is automatic promotion for Grades 1–8, with retention only in extreme situations.
Georgia	Grade 4	10.0	Grade 8	14.2	Compulsory schooling begins at age 6 according to the Law on General Education, which has been updated within the past ten years. Promotion is automatic for Grades 1–4, and dependent on academic progress for Grades 5–8.
Germany	Grade 4	10.4			Compulsory schooling begins the year a child turns 6. Children must be at least 6 years old before a statutory qualifying date (which varies by state; in most states the date falls between June 30th and September 30th) to begin on August 1st. The official policy grants parents the right to request early admission or postponed enrollment, but the school administration has the final decision. The policy on age of entry has been revised within the past ten years. There is automatic promotion in Grade 1, and promotion policies differ between states for later grades.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

* The TIMSS target population is the grade that represents four years or eight years of schooling counting from the first year of ISCED Level 1. However, IEA has a policy that students do not fall under the minimum average age of 9.5 years old (Fourth grade) or 13.5 years old (Eighth grade) at the time of testing, so England, Malta, and New Zealand assessed students in their fifth year or ninth year of formal schooling.

Appendix C.1: Information about the Students Assessed in TIMSS 2011 (Continued)

Country	Grade 4		Grade 8		Information About Age of Entry, Promotion, and Retention
	Country's Name for Fourth Year of Formal Schooling*	Average Age at Time of Testing	Country's Name for Eighth Year of Formal Schooling*	Average Age at Time of Testing	
Ghana			Junior High School Form Two	15.8	Children begin school the calendar year of their 6th birthday. Promotion is automatic in Grades 1–6 and dependent on academic progress for Grades 7–9. Promotion is mostly automatic in public schools.
Hong Kong SAR	Primary 4	10.1	Secondary 2	14.2	Children begin school the September after they turn 5 years, 8 months old. Representatives of the Education Bureau may prescribe a maximum rate of repetition.
Hungary	Grade 4	10.7	Grade 8	14.7	Children begin school during the calendar year they turn 6 if their birthday is before May 31st; however, children may begin during the calendar year of their 6th, 7th, or 8th birthday at parental request. Promotion is automatic in Grades 1–3, and dependent on academic progress for Grades 4–8.
Indonesia			Grade 8	14.3	Children must be 7 years old by the end of June to begin on July 12th, although parents have some choice in starting children at age 6. Promotion is dependent on academic progress for Grades 1–8.
Iran, Islamic Rep. of	Grade 4	10.2	Grade 8	14.3	Children must be 6 years old by September 22nd to begin school September 23rd, although there are few private schools that allow registration at 6.5 years. Students with failing grades in June must take a cumulative exam in September to determine promotion or retention.
Ireland	Fourth Class	10.3			The Education (Welfare) Act of 2000 requires children to attend primary schools from the time that they are 6 years old but not before they are 4. In practice, nearly half of 4-year-olds and almost all 5-year-olds are enrolled in infant classes in primary schools. Children only are allowed to repeat a year for educational reasons and in exceptional circumstances.
Israel			Grade 8	14.0	The official policy is that children begin school the calendar year of their 6th birthday, but parents have the final say if they feel their children are not ready to begin. There is retention only in exceptional cases.
Italy	Grade 4	9.7	Grade 8	13.8	Children begin school the calendar year of their 6th birthday, but parents can enroll children who will turn 6 years old by April 30th of the following calendar year in the calendar year of their 5th birthday. The age of entry policy has been revised within the past ten years. Promotion is dependent on academic progress for Grades 1–8.
Japan	Grade 4	10.5	Grade 8	14.5	Compulsory schooling begins at age 6, and children must be 6 years old by April 1st to start school. There is no policy for promotion and retention.
Jordan			Grade 8	13.9	Compulsory schooling begins at 6 years old. Children must be at least 5 years, 8 months old by September 1st to begin school. Promotion is dependent on academic progress in Arabic and mathematics for Grades 1–3, with parental consent, and dependent on academic progress for Grades 4–8. Students should not repeat a grade more than twice.
Kazakhstan	Grade 4	10.4	Grade 8	14.6	According to the Law of Education (2007), children must begin school at age 6, though parents can postpone enrollment for one year. The age of entry policy has changed within the past ten years. Promotion is dependent on academic progress for Grades 1–4, and dependent on successfully passing exams for Grades 5–8.
Korea, Rep. of	Grade 4	10.4	Grade 8	14.3	Children begin school during the calendar year of their 6th birthday, and must be 6 years old by the end of December to begin school in March of that year. Parents can decide to send their children a year later (at age 7), for health reasons, or a year early (at age 5). Promotion is dependent on academic progress and attendance for Grades 1–8.
Kuwait	Grade 4	9.7			Children must be 6 years old by March 15th to begin school that calendar year, and children typically begin primary school at age 5.5 or 6. Promotion is automatic for Grades 1–3 and dependent on academic progress for Grades 4–8.
Lebanon			Grade 8	14.3	Children must be 6 years old by the end of June to begin school the following September, although in public schools, special cases may be authorized by the Ministry of Education. Promotion is automatic for Grades 1–6 and dependent on academic progress for Grades 7–8.
Lithuania	Grade 4	10.7	Grade 8	14.7	Children must begin school by the calendar year of their 7th birthday, but parents can enroll children one year early if the child satisfies the requirements of the Ministry of Education and Science. The age of entry policy has been revised within the past ten years. There is no national policy on promotion and retention; decisions are made at the school level.
Macedonia, Rep. of			Grade 8	14.7	Since 2007, children must be 6 years old by the end of December to begin school the following September. Before 2007, children had to be 6 years old by the end of May to begin school the following September. Promotion is automatic for Grades 1–5 and dependent on academic progress for Grades 6–8.
Malaysia			Form 2	14.4	Children begin school at the beginning of January of the calendar year of their 6th birthday. There is no policy for promotion and retention.
Malta	Year 5	9.8			Children begin school in late September of the calendar year of their 5th birthday. Students repeat a class only in exceptional circumstances in primary school and on the basis of their academic performance and other factors in exceptional circumstances in secondary school. Students can be retained only once during each education cycle.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Appendix C.1: Information about the Students Assessed in TIMSS 2011 (Continued)

Country	Grade 4		Grade 8		Information About Age of Entry, Promotion, and Retention
	Country's Name for Fourth Year of Formal Schooling*	Average Age at Time of Testing	Country's Name for Eighth Year of Formal Schooling*	Average Age at Time of Testing	
Morocco	Grade 4	10.5	Grade 8	14.7	Children must be at least 5 years, 6 months old by the beginning of September to begin school, and parents rarely postpone the start. Promotion depends on academic progress for both primary and secondary grades.
Netherlands	Group 6	10.2			Children must begin kindergarten on the first school day of the month after their 5th birthday. Most children begin kindergarten when they turn 4 and primary education at age 6, although some children begin primary education a year later at age 7. Promotion and retention are decided by the school, dependent on academic progress.
New Zealand	Year 5	9.9	Year 9	14.1	Children must be enrolled in school by their 6th birthday but have the right to begin school at age 5, and nearly all children begin school on or soon after their 5th birthday. There is automatic promotion, with retention only in very special circumstances with school and parental input.
Northern Ireland	Year 6	10.4			Children must be 4 years old by July 1st to begin school in September. The majority of children start and continue with their age group, but some transfer to post-primary a year late or early.
Norway	Grade 4 (4. trinn)	9.7	Grade 8 (8.trinn)	13.7	Children must begin school the calendar year of their 6th birthday. There is automatic promotion for all grades.
Oman	Grade 4	9.9	Grade 8	14.1	Children begin school the year of their 6th birthday. Children must be at least 5 years, 9 months old at the start of the academic year (beginning of September), but parents can enroll their children in private schools where the official entry age is 5 years, 5 months. The age of entry policy has been revised within the past ten years. Promotion is automatic for Grades 1–4 and dependent on academic progress for Grades 5–8.
Palestinian Nat'l Auth.			Grade 8	13.9	Children must be 5 years, 9 months old by the beginning of the September in which they enroll. Parents can enroll children in private schools two months earlier than public schools. Promotion is automatic for Grades 1–3 and dependent on academic progress for Grades 4–8. A maximum of 5% of students in each class may be retained.
Poland	Grade 3	9.9			Children must begin school the calendar year of their 7th birthday, but parents can postpone the beginning of school for medical or psychological reasons. The age of entry policy has been revised within the past ten years. Parental consent is required for retention in Grades 1–6, and promotion is dependent upon academic progress in higher grades.
Portugal	Grade 4	10.0			Children must begin school the year of their 6th birthday if they turn 6 years old by September 15th. Parents can enroll children who turn 6 years old by the end of December, depending on school availability. The age of entry policy has been revised within the past ten years. Promotion is automatic for Grade 1, and dependent on academic progress for Grades 2–8.
Qatar	Grade 4	10.0	Grade 8	14.0	Children must begin school in the September of the calendar year of their 6th birthday, but parents can enroll their children in private schools where the official entry age is 5 years, 5 months. Promotion is dependent on academic progress for Grades 1–8.
Romania	Grade 4	10.9	Grade 8	14.9	According to the law of education, which has been revised within the past ten years, children must begin school at age 6, although parents can postpone enrollment for one year. Promotion is automatic for Grade 1, and dependent on academic progress for Grades 2–8.
Russian Federation	Grade 4	10.8	Grade 8	14.7	Children must be at least 6 years, 6 months old by the end of August to begin school in September but typically begin at age 7. Promotion is automatic for Grade 1 and dependent on academic progress for Grades 2–8.
Saudi Arabia	Grade 4	10.0	Intermediate Year 2	14.1	Children must begin school the calendar year of their 6th birthday. There is no policy on promotion and retention.
Serbia	Grade 4	10.8			Children must begin school between the ages of 6.5 and 7.5 years old. Schools may recommend one year of continued preparatory preschool for children not considered school ready. The age of entry policy has changed within the past ten years. Promotion is automatic for Grade 1 and generally automatic for Grades 2–3, except by parental request. In Grades 4–7, students failing 2 or more subjects must pass makeup exams.
Singapore	Primary 4	10.4	Secondary 2	14.4	According to the Compulsory Education Act, children must begin school the calendar year of their 7th birthday, although parents may seek a deferral of registration based on medical grounds. There is automatic promotion for Grades 1–4; retention is at principal's discretion for Grade 5 and dependent on academic progress for Grades 6–8.
Slovak Republic	Grade 4	10.4			Children must begin school in September if they turn 6 years old by August 31st. Children may begin school early or after an approved delay, based on psychological tests and professional recommendations. Promotion is dependent on academic progress. Students failing 1–2 required subjects must pass a makeup exam; students failing more than 2 are retained.
Slovenia	Grade 4	9.9	Grade 8	13.9	Children must begin school the calendar year of their 6th birthday, but some children who are 6 years old in January enter school in the September of the calendar year before they turn 6. The age of entry policy has been revised within the past ten years. Generally, there is automatic promotion for Grades 1–8, except for students with learning difficulties.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Appendix C.1: Information about the Students Assessed in TIMSS 2011 (Continued)

Country	Grade 4		Grade 8		Information About Age of Entry, Promotion, and Retention
	Country's Name for Fourth Year of Formal Schooling*	Average Age at Time of Testing	Country's Name for Eighth Year of Formal Schooling*	Average Age at Time of Testing	
Spain	Primary Education Year 4	9.8			Children must begin school the calendar year of their 6th birthday. Almost every child begins kindergarten at the age of 3 even though it is not compulsory. Students can be retained for 1 year during Grades 1–6, but students with special needs can be retained twice. Students that don't reach the goals in Grades 7 and 8 can be retained in both grades.
Sweden	Grade 4	10.7	Grade 8	14.8	Children begin school in the fall of the calendar year of their 7th birthday but can begin the year they turn 6 or 8 years old for special reasons. There is automatic promotion for all grades.
Syrian Arab Republic			Grade 8	13.9	Children must begin school the September following their 6th birthday. Promotion for Grades 1–8 is based on academic progress, but promotion is automatic when a student fails a grade for the second time.
Thailand	Primary 4	10.5	Middle School 2	14.3	Children must begin school by the year of their 7th birthday, but can begin at the age of 6. There is no policy for promotion and retention.
Tunisia	Year 4 of Primary Education	10.0	Year 8 of Basic Education	14.3	Children begin school in the September of the calendar year of their 6th birthday. Younger children are accepted if there are school vacancies in the area where they live. Promotion is dependent on academic progress in Arabic, French, mathematics, and science for Grades 1–6, and dependent on academic progress for Grades 7–8.
Turkey	Grade 4	10.1	Grade 8	14.0	Children begin school in September of the calendar year of their 6th birthday, although they can begin a year later, at parental discretion. Promotion is automatic for Grades 1–3 and dependent on academic progress for Grades 4–8.
Ukraine			Grade 8	14.2	Compulsory schooling begins at age 6. Children must be at least 6 years old by September 1st to begin school, and parents can decide if children begin school at age 6 or 7. Retention is decided by parents, and students can take external examinations to advance into higher grade levels.
United Arab Emirates	Grade 4	9.8	Grade 8	13.9	Children can begin school when they are 5.5 years old. Parents or guardians can decide when children begin school, but it must by age 8. The age of entry policy has been revised within the past ten years. Students in Grades 1–5 are subject to remedial instruction for promotion, and promotion in Grades 6–8 is dependent on academic achievement.
United States	Grade 4	10.2	Grade 8	14.2	Varies by state, but children commonly begin kindergarten at age 5 (by parental choice) and typically begin primary school at age 6 (by law).
Yemen	Grade 4	11.2			Children can begin school the year of their 6th birthday, but some flexibility exists at the discretion of the school's director. Promotion is automatic for Grades 1–3 and dependent on academic progress for Grades 4–8.
Out of Grade Participants					
Botswana	Standard 6	12.8	Form 2	15.8	Children must be 6 years old by the end of June to begin school in the January of the same calendar year, but children from remote areas may begin school later than age 6. There is up to 12.5% retention in each class and accelerated progression is possible after parent consultation.
Honduras	Grade 6	12.7	Grade 9	15.7	Children must be 7 years old by the end of January to begin school the following February, but about 30% of children typically begin primary school at age 6, per principals' decisions. Promotion is dependent on academic progress on exams prepared and administered by teachers.
South Africa			Grade 9	16.0	Children must be 6 years old by June 30th of the year in which they enroll and children are encouraged to begin at age 7. The age of entry policy has been revised within the past ten years. In principle, students should progress with their age cohort. The norm for repetition is one year per school phase where necessary.
Yemen	Grade 6	13.2			Children can begin school the year of their 6th birthday, but some flexibility exists at the discretion of the school's director. Promotion is automatic for Grades 1–3 and dependent on academic progress for Grades 4–8.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Appendix C.1: Information about the Students Assessed in TIMSS 2011 (Continued)

Country	Grade 4		Grade 8		Information About Age of Entry, Promotion, and Retention
	Country's Name for Fourth Year of Formal Schooling*	Average Age at Time of Testing	Country's Name for Eighth Year of Formal Schooling*	Average Age at Time of Testing	
Benchmarking Participants					
Alberta, Canada	Grade 4	9.9	Grade 8	13.9	The law requires all children who are 6 years old by September 1 to attend school, although school boards may set their own age requirements for entering school, and many allow children to enter Grade 1 if they are 6 years old by March 1 of the following year. Parental discretion or choice is allowed. School principals make promotion decisions in line with school policies.
Ontario, Canada	Grade 4	9.8	Grade 8	13.8	Children must attend school in September if they turn 6 years old by September 1 but also have the right to attend school in September if they will turn 6 by December 31 of that calendar year. Parents may choose to enroll their children in junior kindergarten at age 4 or senior kindergarten at age 5. School principals make promotion decisions, appealable to the school board.
Quebec, Canada	Grade 4	10.1	Secondary 2	14.2	Children must be 6 years old by September 30th to begin school in the September of that calendar year. School boards determine promotion and the Ministry sets rules for obtaining diplomas.
Abu Dhabi, UAE	Grade 4	9.7	Grade 8	13.8	Children must be 6 years old by October 1st of the school year in which they enroll. Parents sometimes place students in private schools that accept younger students, then transfer them to the public system. The age of entry policy has changed within the past ten years. There is automatic promotion in Grades 1–5, except in special cases and with parental consent. Promotion is dependent on academic progress in Grades 6–8.
Dubai, UAE	Grade 4	9.8	Grade 8	13.9	Children can begin school the calendar year of their 5th birthday. The policy on promotion and retention varies by school type.
Alabama, US			Grade 8	14.4	According to the code of Alabama 1875 Section 16-28-3, children must begin school at age 7, and typically children actually do begin at age 7. The age of entry policy has changed within the past ten years. There is no policy for promotion or retention.
California, US			Grade 8	14.1	California law requires a child to be 6 years old on or before December 2 for the 2011-12 school year to enter Grade 1. However, the cut-off date for entry is in the process of being moved earlier by several months (California Education Code Section 48010). Although kindergarten is not required, most parents and guardians choose to enroll their children in kindergarten. There is no policy for promotion and retention.
Colorado, US			Grade 8	14.2	Children 6 years old on or before August 1st are required to begin school during that calendar year. Parents may opt to send their children to private or parochial schools or home school them if they choose not to meet the state policy. The age of entry policy has changed within the past ten years. Promotion and retention policies are decided by local education agencies.
Connecticut, US			Grade 8	14.1	Children must begin school by the time they are 7 years old. A 4-year-old may enroll in preprimary education (kindergarten) at the beginning of a school year (August or September) if he or she will turn 5 on or before January 1 of that school year. Some parents elect to delay school enrollment for younger children, and state law allows this practice provided students are enrolled in school when they are 7 years of age. Promotion and retention decisions are made locally at the district or school level.
Florida, US	Grade 4	10.4	Grade 8	14.4	Florida law (Section 1003.21 (1) (a)) specifies that children who are 6 or who will be 6 by February 1st of that school year are required to attend school. If a child enters public school at age 6 without completing kindergarten, they will be placed in kindergarten. Children who have attained the age of 5 on or before September 1 of the school year are eligible for admission to public kindergarten during that school year based on rules prescribed by the school board. Statewide, students are retained after Grade 3 if they do not pass the state reading assessment. Otherwise, policies for promotion and retention are determined by districts, based on academic performance.
Indiana, US			Grade 8	14.4	Children are not required to be in school until the school year in which they turn 7 years old. Children must be 5 years old on or before August 1st to begin kindergarten during that calendar year. Students are retained after Grade 3 if they do not pass the state reading assessment.
Massachusetts, US			Grade 8	14.2	Each child must attend school beginning in September of the calendar year in which he or she turns 6. Each school committee may establish its own minimum permissible age for school attendance, provided that such age is not older than the state mandatory minimum age (established by state law 603CMR 8.00). There is no policy for promotion and retention.
Minnesota, US			Grade 8	14.3	Compulsory schooling begins at age 7. Children must be at least 5 years old by September 1st to begin kindergarten, or 6 years old by September 1st to begin Grade 1 (MN Statute 120A.20). Any school board may establish a policy for admission at an earlier age. There is no policy for promotion and retention.
North Carolina, US	Grade 4	10.2	Grade 8	14.2	Compulsory schooling begins at age 7. If the child is 5 years old on or before August 31st the child is eligible to begin kindergarten. The statute recognizes that some students will be presented for enrollment who can be more appropriately served at a higher grade level, and it authorizes the school principal to make such decisions. There is no policy for promotion and retention.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Appendix C.2: Coverage of TIMSS 2011 Target Population

Country	International Target Population		Exclusions from National Target Population		
	Coverage	Notes on Coverage	School-level Exclusions	Within-sample Exclusions	Overall Exclusions
Armenia	100%		2.0%	0.0%	2.0%
Australia	100%		2.1%	2.3%	4.4%
Austria	100%		1.3%	3.8%	5.1%
2 a Azerbaijan	100%		2.3%	4.9%	7.2%
Bahrain	100%		0.4%	0.7%	1.1%
Belgium (Flemish)	100%		0.5%	4.5%	5.0%
Chile	100%		1.8%	1.9%	3.7%
Chinese Taipei	100%		0.1%	1.4%	1.4%
2 Croatia	100%		2.9%	5.0%	7.9%
Czech Republic	100%		4.1%	0.9%	5.1%
2 Denmark	100%		1.6%	4.7%	6.3%
England	100%		1.7%	0.4%	2.0%
Finland	100%		1.6%	1.5%	3.1%
1 a Georgia	92%	Students taught in Georgian	1.4%	3.5%	4.9%
Germany	100%		0.9%	1.0%	1.9%
2 Hong Kong SAR	100%		5.8%	2.7%	8.6%
Hungary	100%		2.2%	2.0%	4.2%
Iran, Islamic Rep. of	100%		4.4%	0.1%	4.5%
Ireland	100%		1.6%	0.9%	2.5%
Italy	100%		0.0%	3.7%	3.7%
Japan	100%		2.2%	1.0%	3.2%
2 Kazakhstan	100%		3.7%	2.5%	6.3%
Korea, Rep. of	100%		1.5%	1.0%	2.5%
1 Kuwait	78%	Students in public schools	0.3%	0.0%	0.3%
1 2 Lithuania	93%	Students taught in Lithuanian	1.9%	3.7%	5.6%
Malta	100%		0.0%	3.6%	3.6%
Morocco	100%		2.0%	0.0%	2.0%
Netherlands	100%		3.7%	0.4%	4.0%
New Zealand	100%		2.8%	2.2%	4.9%
Northern Ireland	100%		2.6%	0.9%	3.5%
Norway	100%		0.9%	3.3%	4.3%
Oman	100%		0.8%	0.7%	1.5%
Poland	100%		2.3%	1.5%	3.8%
Portugal	100%		1.4%	1.1%	2.5%
2 Qatar	100%		4.3%	1.9%	6.2%
Romania	100%		1.1%	2.9%	4.0%
Russian Federation	100%		2.9%	2.4%	5.3%
Saudi Arabia	100%		1.4%	0.2%	1.6%
2 Serbia	100%		5.3%	4.1%	9.4%
2 Singapore	100%		5.9%	0.4%	6.3%
Slovak Republic	100%		3.8%	0.8%	4.6%
Slovenia	100%		2.3%	0.3%	2.6%
Spain	100%		1.6%	3.6%	5.3%
Sweden	100%		1.9%	2.2%	4.1%
Thailand	100%		1.5%	0.0%	1.5%
Tunisia	100%		2.3%	0.1%	2.5%
Turkey	100%		1.0%	1.5%	2.5%
United Arab Emirates	100%		1.4%	1.8%	3.3%
2 United States	100%		0.0%	7.0%	7.0%
Yemen	100%		3.0%	0.7%	3.7%

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

1 National Target Population does not include all of the International Target Population.
2 National Defined Population covers 90% to 95% of National Target Population.
3 National Defined population covers less than 90% of National Target population (but at least 77%).
a Exclusion rates for Azerbaijan and Georgia are slightly underestimated as some conflict zones were not covered and no official statistics were available.

Appendix C.2: Coverage of TIMSS 2011 Target Population (Continued)

TIMSS 2011 Mathematics 4th Grade

Country	International Target Population		Exclusions from National Target Population		
	Coverage	Notes on Coverage	School-level Exclusions	Within-sample Exclusions	Overall Exclusions
Sixth Grade Participants					
Botswana	100%		0.1%	0.2%	0.3%
Honduras	100%		3.8%	0.7%	4.5%
Yemen	100%		3.3%	0.7%	4.0%
Benchmarking Participants					
[2] Alberta, Canada	100%		1.5%	6.1%	7.5%
Ontario, Canada	100%		1.0%	4.3%	5.3%
Quebec, Canada	100%		2.7%	1.0%	3.7%
Abu Dhabi, UAE	100%		1.4%	1.3%	2.7%
Dubai, UAE	100%		0.4%	4.8%	5.1%
[1 3] Florida, US	89%	Students in public schools	0.0%	12.1%	12.1%
[1 2] North Carolina, US	93%	Students in public schools	0.0%	10.1%	10.1%

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Appendix C.3: Coverage of TIMSS 2011 Target Population

Country	International Target Population		Exclusions from National Target Population		
	Coverage	Notes on Coverage	School-level Exclusions	Within-sample Exclusions	Overall Exclusions
Armenia	100%		1.5%	0.0%	1.5%
Australia	100%		1.3%	1.9%	3.2%
Bahrain	100%		0.5%	1.1%	1.6%
Chile	100%		1.1%	1.7%	2.8%
Chinese Taipei	100%		0.1%	1.2%	1.3%
England	100%		2.2%	0.1%	2.2%
Finland	100%		2.6%	0.9%	3.4%
1 a Georgia	93%	Students taught in Georgian	0.9%	3.7%	4.5%
Ghana	100%		0.6%	0.0%	0.6%
Hong Kong SAR	100%		3.9%	1.3%	5.3%
Hungary	100%		2.3%	2.1%	4.4%
Indonesia	100%		3.2%	0.0%	3.2%
Iran, Islamic Rep. of	100%		2.2%	0.0%	2.2%
3 Israel	100%		16.4%	6.1%	22.6%
Italy	100%		0.0%	4.6%	4.7%
Japan	100%		1.8%	1.0%	2.8%
Jordan	100%		0.0%	0.4%	0.4%
Kazakhstan	100%		3.8%	1.3%	5.1%
Korea, Rep. of	100%		1.0%	0.9%	1.9%
Lebanon	100%		1.4%	0.0%	1.4%
1 Lithuania	93%	Students taught in Lithuanian	1.4%	3.4%	4.8%
Macedonia, Rep. of	100%		2.8%	0.6%	3.3%
Malaysia	100%		0.1%	0.0%	0.1%
Morocco	100%		0.1%	0.0%	0.1%
New Zealand	100%		2.0%	1.2%	3.2%
Norway	100%		0.5%	1.4%	1.9%
Oman	100%		0.9%	0.3%	1.2%
Palestinian Nat'l Auth.	100%		0.6%	0.9%	1.5%
Qatar	100%		4.0%	0.5%	4.5%
Romania	100%		0.0%	1.2%	1.3%
2 Russian Federation	100%		2.9%	3.1%	6.0%
Saudi Arabia	100%		1.2%	0.1%	1.2%
2 Singapore	100%		5.7%	0.4%	6.0%
Slovenia	100%		1.7%	0.6%	2.3%
Sweden	100%		2.2%	2.9%	5.1%
Syrian Arab Republic	100%		1.9%	0.0%	1.9%
Thailand	100%		1.4%	0.1%	1.5%
Tunisia	100%		0.3%	0.1%	0.3%
Turkey	100%		0.2%	1.2%	1.5%
Ukraine	100%		2.5%	0.4%	2.8%
United Arab Emirates	100%		1.5%	1.3%	2.8%
2 United States	100%		0.0%	7.2%	7.2%

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

1 National Target Population does not include all of the International Target Population.
2 National Defined Population covers 90% to 95% of National Target Population.
3 National Defined population covers less than 90% of National Target population (but at least 77%).
a Exclusion rates for Georgia are slightly underestimated as some conflict zones were not covered and no official statistics were available.

Appendix C.3: Coverage of TIMSS 2011 Target Population (Continued)

TIMSS 2011 Mathematics 8th Grade

Country	International Target Population		Exclusions from National Target Population		
	Coverage	Notes on Coverage	School-level Exclusions	Within-sample Exclusions	Overall Exclusions
Ninth Grade Participants					
Botswana	100%		0.0%	0.0%	0.0%
[2] Honduras	100%		3.0%	2.7%	5.6%
South Africa	100%		1.4%	0.0%	1.4%
Benchmarking Participants					
[2] Alberta, Canada	100%		1.5%	5.9%	7.4%
[2] Ontario, Canada	100%		0.8%	4.8%	5.6%
Quebec, Canada	100%		2.0%	3.0%	4.9%
Abu Dhabi, UAE	100%		1.1%	0.6%	1.7%
Dubai, UAE	100%		0.2%	3.8%	4.0%
[1] Alabama, US	92%	Students in public schools	0.0%	4.6%	4.6%
[1 2] California, US	91%	Students in public schools	0.0%	5.6%	5.6%
[1] Colorado, US	94%	Students in public schools	0.0%	4.1%	4.1%
[1 2] Connecticut, US	90%	Students in public schools	0.0%	8.5%	8.5%
[1 2] Florida, US	89%	Students in public schools	0.0%	6.9%	6.9%
[1 2] Indiana, US	90%	Students in public schools	0.0%	6.3%	6.3%
[1 2] Massachusetts, US	89%	Students in public schools	0.0%	7.9%	7.9%
[1] Minnesota, US	90%	Students in public schools	0.0%	4.3%	4.3%
[1 3] North Carolina, US	93%	Students in public schools	0.0%	11.4%	11.4%

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Appendix C.4: School Sample Sizes

Country	Number of Schools in Original Sample	Number of Eligible Schools in Original Sample	Number of Schools in Original Sample that Participated	Number of Replacement Schools that Participated	Total Number of Schools that Participated
Armenia	150	150	150	0	150
Australia	290	284	275	5	280
Austria	160	158	158	0	158
Azerbaijan	170	169	142	27	169
Bahrain	174	172	159	0	159
Belgium (Flemish)	156	150	114	28	142
Chile	203	202	169	31	200
Chinese Taipei	150	150	150	0	150
Croatia	152	152	150	2	152
Czech Republic	180	178	161	16	177
Denmark	240	235	186	30	216
England	150	150	122	3	125
Finland	150	146	141	4	145
Georgia	180	177	172	1	173
Germany	200	199	190	7	197
Hong Kong SAR	154	154	134	2	136
Hungary	150	150	146	3	149
Iran, Islamic Rep. of	250	244	244	0	244
Ireland	152	151	147	3	150
Italy	205	205	166	36	202
Japan	150	150	144	5	149
Kazakhstan	150	149	147	2	149
Korea, Rep. of	150	150	150	0	150
Kuwait	150	150	148	0	148
Lithuania	160	154	145	9	154
Malta	99	96	96	0	96
Morocco	289	287	286	0	286
Netherlands	151	148	75	53	128
New Zealand	189	189	154	26	180
Northern Ireland	160	160	100	36	136
Norway	150	145	84	35	119
Oman	338	333	327	0	327
Poland	150	150	150	0	150
Portugal	150	150	132	15	147
Qatar	175	167	166	0	166
Romania	150	148	147	1	148
Russian Federation	202	202	202	0	202
Saudi Arabia	175	171	163	8	171
Serbia	160	156	152	4	156
Singapore	176	176	176	0	176
Slovak Republic	200	198	187	10	197
Slovenia	202	201	193	2	195
Spain	152	152	147	4	151
Sweden	161	153	148	4	152
Thailand	168	168	143	25	168
Tunisia	222	222	222	0	222
Turkey	260	257	251	6	257
United Arab Emirates	478	460	459	0	459
United States	450	437	347	22	369
Yemen	223	218	216	0	216
Sixth Grade Participants					
Botswana	150	149	149	0	149
Honduras	152	147	133	14	147
Yemen	150	147	146	0	146
Benchmarking Participants					
Alberta, Canada	150	144	141	2	143
Ontario, Canada	150	149	145	1	146
Quebec, Canada	200	197	189	1	190
Abu Dhabi, UAE	168	165	164	0	164
Dubai, UAE	152	139	139	0	139
Florida, US	81	80	77	0	77
North Carolina, US	49	49	46	0	46

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Appendix C.5: School Sample Sizes

TIMSS 2011 8th Grade Mathematics

Country	Number of Schools in Original Sample	Number of Eligible Schools in Original Sample	Number of Schools in Original Sample that Participated	Number of Replacement Schools that Participated	Total Number of Schools that Participated
Armenia	153	153	153	0	153
Australia	290	287	276	1	277
Bahrain	97	96	95	0	95
Chile	197	196	166	27	193
Chinese Taipei	150	150	150	0	150
England	150	150	113	5	118
Finland	150	148	143	2	145
Georgia	180	175	171	1	172
Ghana	163	161	161	0	161
Hong Kong SAR	150	150	116	1	117
Hungary	150	147	144	2	146
Indonesia	154	153	153	0	153
Iran, Islamic Rep. of	250	238	237	1	238
Israel	152	151	143	8	151
Italy	204	204	166	31	197
Japan	150	150	128	10	138
Jordan	232	230	230	0	230
Kazakhstan	150	147	146	1	147
Korea, Rep. of	150	150	150	0	150
Lebanon	150	150	136	11	147
Lithuania	150	142	132	9	141
Macedonia, Rep. of	150	150	150	0	150
Malaysia	180	180	180	0	180
Morocco	285	280	279	0	279
New Zealand	162	162	141	17	158
Norway	150	150	134	0	134
Oman	338	333	323	0	323
Palestinian Nat'l Auth.	203	201	201	0	201
Qatar	113	110	109	0	109
Romania	150	147	145	2	147
Russian Federation	210	210	210	0	210
Saudi Arabia	154	153	150	3	153
Singapore	165	165	165	0	165
Slovenia	191	191	183	3	186
Sweden	159	156	152	1	153
Syrian Arab Republic	150	150	148	0	148
Thailand	172	172	160	12	172
Tunisia	217	211	207	0	207
Turkey	240	239	237	2	239
Ukraine	150	148	146	2	148
United Arab Emirates	477	460	458	0	458
United States	600	574	499	2	501
Ninth Grade Participants					
Botswana	150	150	150	0	150
Honduras	160	155	134	21	155
South Africa	298	285	283	2	285
Benchmarking Participants					
Alberta, Canada	150	147	133	12	145
Ontario, Canada	150	146	142	1	143
Quebec, Canada	200	198	189	0	189
Abu Dhabi, UAE	170	167	166	0	166
Dubai, UAE	143	131	130	0	130
Alabama, US	63	60	55	0	55
California, US	94	93	79	3	82
Colorado, US	60	60	50	3	53
Connecticut, US	63	62	62	0	62
Florida, US	65	64	60	0	60
Indiana, US	62	58	55	1	56
Massachusetts, US	58	56	56	0	56
Minnesota, US	60	56	51	4	55
North Carolina, US	62	60	59	0	59

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Appendix C.6: Student Sample Sizes

Country	Within-school Student Participation (Weighted Percentage)	Number of Sampled Students in Participating Schools	Number of Students Withdrawn from Class/School	Number of Students Excluded	Number of Eligible Students	Number of Students Absent	Number of Students Assessed
Armenia	98%	5,292	1	0	5,291	145	5,146
Australia	95%	6,709	103	122	6,484	338	6,146
Austria	98%	4,976	25	175	4,776	108	4,668
Azerbaijan	100%	5,098	206	0	4,892	10	4,882
Bahrain	98%	4,213	32	20	4,161	78	4,083
Belgium (Flemish)	98%	5,219	84	196	4,939	90	4,849
Chile	96%	6,010	81	79	5,850	265	5,585
Chinese Taipei	99%	4,376	18	35	4,323	39	4,284
Croatia	95%	5,097	27	245	4,825	241	4,584
Czech Republic	95%	4,895	28	35	4,832	254	4,578
Denmark	95%	4,452	54	183	4,215	228	3,987
England	94%	3,689	49	13	3,627	230	3,397
Finland	96%	4,917	23	53	4,841	203	4,638
Georgia	99%	4,958	23	56	4,879	80	4,799
Germany	96%	4,229	37	21	4,171	176	3,995
Hong Kong SAR	93%	4,330	21	65	4,244	287	3,957
Hungary	97%	5,488	40	67	5,381	177	5,204
Iran, Islamic Rep. of	99%	5,932	98	5	5,829	69	5,760
Ireland	95%	4,836	22	43	4,771	211	4,560
Italy	97%	4,529	26	153	4,350	150	4,200
Japan	97%	4,595	10	48	4,537	126	4,411
Kazakhstan	99%	4,521	37	41	4,443	61	4,382
Korea, Rep. of	98%	4,494	46	42	4,406	72	4,334
Kuwait	94%	4,431	0	0	4,431	289	4,142
Lithuania	94%	5,140	37	131	4,972	284	4,688
Malta	95%	3,958	24	142	3,792	185	3,607
Morocco	97%	8,414	273	0	8,141	300	7,841
Netherlands	97%	3,461	120	13	3,328	99	3,229
New Zealand	94%	6,172	129	96	5,947	375	5,572
Northern Ireland	93%	3,942	27	49	3,866	295	3,571
Norway	85%	3,881	21	122	3,738	617	3,121
Oman	98%	10,840	129	75	10,636	225	10,411
Poland	96%	5,316	15	71	5,230	203	5,027
Portugal	94%	4,384	18	64	4,302	260	4,042
Qatar	99%	4,394	178	70	4,146	29	4,117
Romania	98%	4,879	91	12	4,776	103	4,673
Russian Federation	98%	4,693	30	89	4,574	107	4,467
Saudi Arabia	99%	4,625	42	4	4,579	64	4,515
Serbia	97%	4,603	32	54	4,517	138	4,379
Singapore	96%	6,687	33	3	6,651	283	6,368
Slovak Republic	96%	5,933	45	46	5,842	226	5,616
Slovenia	97%	4,674	13	14	4,647	155	4,492
Spain	97%	4,461	16	156	4,289	106	4,183
Sweden	92%	5,235	75	84	5,076	413	4,663
Thailand	99%	4,556	74	0	4,482	34	4,448
Tunisia	99%	5,057	81	4	4,972	60	4,912
Turkey	98%	7,905	159	105	7,641	162	7,479
United Arab Emirates	97%	15,428	135	113	15,180	460	14,720
United States	95%	14,205	185	839	13,181	612	12,569
Yemen	97%	8,794	412	20	8,362	304	8,058

Students attending a sampled class at the time the sample was chosen but leaving the class before the assessment was administered were classified as "withdrawn."
Students with a disability or language barrier that prevented them from participating in the assessment were classified as "excluded."
Students not present when the assessment was administered, and not subsequently assessed in a make-up session, were classified as "absent."

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Appendix C.6: Student Sample Sizes (Continued)

TIMSS 2011 Mathematics 4th Grade

Country	Within-school Student Participation (Weighted Percentage)	Number of Sampled Students in Participating Schools	Number of Students Withdrawn from Class/School	Number of Students Excluded	Number of Eligible Students	Number of Students Absent	Number of Students Assessed
Sixth Grade Participants							
Botswana	99%	4,298	39	8	4,251	53	4,198
Honduras	97%	4,186	117	0	4,069	150	3,919
Yemen	96%	5,364	212	15	5,137	208	4,929
Benchmarking Participants							
Alberta, Canada	96%	4,086	84	187	3,815	170	3,645
Ontario, Canada	96%	5,022	75	165	4,782	212	4,570
Quebec, Canada	95%	4,529	33	50	4,446	211	4,235
Abu Dhabi, UAE	98%	4,308	13	29	4,266	102	4,164
Dubai, UAE	96%	6,553	71	74	6,408	257	6,151
Florida, US	95%	3,121	43	265	2,813	152	2,661
North Carolina, US	95%	2,104	13	203	1,888	96	1,792

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Appendix C.7: Student Sample Sizes

Country	Within-school Student Participation (Weighted Percentage)	Number of Sampled Students in Participating Schools	Number of Students Withdrawn from Class/School	Number of Students Excluded	Number of Eligible Students	Number of Students Absent	Number of Students Assessed
Armenia	97%	6,057	0	0	6,057	211	5,846
Australia	90%	9,007	192	141	8,674	1,118	7,556
Bahrain	98%	4,960	185	27	4,748	108	4,640
Chile	95%	6,290	95	82	6,113	278	5,835
Chinese Taipei	99%	5,166	34	22	5,110	68	5,042
England	89%	4,382	88	3	4,291	449	3,842
Finland	95%	4,549	16	26	4,507	241	4,266
Georgia	98%	4,779	66	51	4,662	99	4,563
Ghana	97%	8,073	486	0	7,587	264	7,323
Hong Kong SAR	96%	4,261	42	55	4,164	149	4,015
Hungary	96%	5,489	28	55	5,406	228	5,178
Indonesia	96%	6,201	190	0	6,011	216	5,795
Iran, Islamic Rep. of	99%	6,264	141	0	6,123	94	6,029
Israel	92%	5,174	19	64	5,091	392	4,699
Italy	96%	4,379	23	210	4,146	167	3,979
Japan	94%	4,747	14	46	4,687	273	4,414
Jordan	96%	8,439	344	28	8,067	373	7,694
Kazakhstan	98%	4,551	70	25	4,456	66	4,390
Korea, Rep. of	99%	5,315	43	42	5,230	64	5,166
Lebanon	96%	4,231	103	0	4,128	154	3,974
Lithuania	93%	5,285	50	100	5,135	388	4,747
Macedonia, Rep. of	95%	4,360	67	23	4,270	208	4,062
Malaysia	98%	6,209	334	0	5,875	142	5,733
Morocco	94%	9,869	333	0	9,536	550	8,986
New Zealand	90%	6,079	128	41	5,910	574	5,336
Norway	94%	4,229	30	53	4,146	284	3,862
Oman	98%	9,947	140	36	9,771	229	9,542
Palestinian Nat'l Auth.	98%	8,069	120	27	7,922	110	7,812
Qatar	99%	4,641	167	18	4,456	34	4,422
Romania	99%	5,704	94	1	5,609	86	5,523
Russian Federation	98%	5,146	38	96	5,012	119	4,893
Saudi Arabia	98%	4,477	35	3	4,439	95	4,344
Singapore	95%	6,314	36	48	6,230	303	5,927
Slovenia	94%	4,722	11	29	4,682	267	4,415
Sweden	94%	6,210	114	137	5,959	386	5,573
Syrian Arab Republic	93%	4,756	0	0	4,756	343	4,413
Thailand	99%	6,404	201	0	6,203	79	6,124
Tunisia	97%	5,464	195	2	5,267	139	5,128
Turkey	97%	7,348	104	94	7,150	222	6,928
Ukraine	98%	3,491	27	14	3,450	72	3,378
United Arab Emirates	97%	14,716	106	48	14,562	473	14,089
United States	94%	11,864	302	398	11,164	687	10,477

Students attending a sampled class at the time the sample was chosen but leaving the class before the assessment was administered were classified as "withdrawn."
Students with a disability or language barrier that prevented them from participating in the assessment were classified as "excluded."
Students not present when the assessment was administered, and not subsequently assessed in a make-up session, were classified as "absent."

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Appendix C.7: Student Sample Sizes (Continued)

TIMSS 2011 8th Grade Mathematics

Country	Within-school Student Participation (Weighted Percentage)	Number of Sampled Students in Participating Schools	Number of Students Withdrawn from Class/School	Number of Students Excluded	Number of Eligible Students	Number of Students Absent	Number of Students Assessed
Ninth Grade Participants							
Botswana	98%	5,610	94	0	5,516	116	5,400
Honduras	96%	4,975	339	0	4,636	218	4,418
South Africa	95%	13,179	455	0	12,724	755	11,969
Benchmarking Participants							
Alberta, Canada	93%	5,579	96	294	5,189	390	4,799
Ontario, Canada	95%	5,198	31	143	5,024	268	4,756
Quebec, Canada	93%	6,879	91	75	6,713	564	6,149
Abu Dhabi, UAE	97%	4,513	11	4	4,498	125	4,373
Dubai, UAE	96%	5,915	57	36	5,822	251	5,571
Alabama, US	92%	2,414	27	87	2,300	187	2,113
California, US	94%	2,898	52	47	2,799	185	2,614
Colorado, US	94%	2,395	60	47	2,288	121	2,167
Connecticut, US	94%	2,356	16	115	2,225	126	2,099
Florida, US	91%	1,986	25	87	1,874	162	1,712
Indiana, US	96%	2,501	49	97	2,355	95	2,260
Massachusetts, US	96%	2,296	20	112	2,164	89	2,075
Minnesota, US	95%	2,720	32	61	2,627	127	2,500
North Carolina, US	95%	2,434	24	203	2,207	104	2,103

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Appendix C.8: Participation Rates (Weighted)

TIMSS 2011 Mathematics 4th Grade

Country	School Participation		Class Participation	Student Participation	Overall Participation	
	Before Replacement	After Replacement			Before Replacement	After Replacement
Armenia	100%	100%	100%	98%	98%	98%
Australia	96%	98%	100%	95%	91%	93%
Austria	100%	100%	100%	98%	98%	98%
Azerbaijan	84%	100%	100%	100%	84%	100%
Bahrain	92%	92%	100%	98%	90%	90%
Belgium (Flemish)	76%	95%	99%	98%	75%	92%
Chile	86%	99%	100%	96%	82%	95%
Chinese Taipei	100%	100%	100%	99%	99%	99%
Croatia	99%	100%	100%	95%	94%	95%
Czech Republic	90%	99%	100%	95%	85%	94%
Denmark	79%	92%	100%	95%	75%	87%
England	81%	83%	100%	94%	76%	78%
Finland	97%	99%	100%	96%	93%	96%
Georgia	97%	98%	100%	99%	95%	96%
Germany	96%	99%	100%	96%	92%	95%
Hong Kong SAR	87%	88%	100%	93%	81%	82%
Hungary	98%	99%	100%	97%	94%	96%
Iran, Islamic Rep. of	100%	100%	100%	99%	99%	99%
Ireland	97%	99%	100%	95%	93%	95%
Italy	81%	98%	100%	97%	78%	95%
Japan	96%	99%	100%	97%	93%	97%
Kazakhstan	99%	100%	100%	99%	98%	99%
Korea, Rep. of	100%	100%	100%	98%	98%	98%
Kuwait	99%	99%	99%	94%	91%	91%
Lithuania	94%	100%	100%	94%	89%	94%
Malta	100%	100%	100%	95%	95%	95%
Morocco	100%	100%	100%	97%	96%	96%
† Netherlands	49%	82%	99%	97%	47%	79%
New Zealand	83%	96%	100%	94%	77%	90%
† Northern Ireland	62%	85%	100%	93%	58%	79%
‡ Norway	57%	82%	100%	85%	48%	70%
Oman	98%	98%	100%	98%	96%	96%
Poland	100%	100%	100%	96%	96%	96%
Portugal	87%	98%	99%	94%	81%	92%
Qatar	100%	100%	100%	99%	99%	99%
Romania	99%	100%	100%	98%	97%	97%
Russian Federation	100%	100%	100%	98%	98%	98%
Saudi Arabia	95%	100%	100%	99%	94%	99%
Serbia	97%	100%	100%	97%	94%	97%
Singapore	100%	100%	100%	96%	96%	96%
Slovak Republic	95%	99%	100%	96%	91%	96%
Slovenia	96%	97%	100%	97%	93%	94%
Spain	96%	99%	100%	97%	94%	97%
Sweden	97%	99%	100%	92%	89%	91%
Thailand	85%	100%	100%	99%	84%	99%
Tunisia	100%	100%	100%	99%	99%	99%
Turkey	97%	100%	100%	98%	95%	98%
United Arab Emirates	100%	100%	100%	97%	97%	97%
United States	79%	84%	100%	95%	76%	80%
Yemen	99%	99%	100%	97%	95%	95%

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

TIMSS guidelines for sampling participation: The minimum acceptable participation rates were 85% of both schools and students, or a combined rate (the product of school and student participation) of 75%. Participants not meeting these guidelines were annotated as follows:
† Met guidelines for sample participation rates only after replacement schools were included.
‡ Nearly satisfied guidelines for sample participation rates after replacement schools were included.
‡ Did not satisfy guidelines for sample participation rates.

Appendix C.8: Participation Rates (Weighted) (Continued)

TIMSS 2011 Mathematics 4th Grade

Country	School Participation		Class Participation	Student Participation	Overall Participation	
	Before Replacement	After Replacement			Before Replacement	After Replacement
Sixth Grade Participants						
Botswana	100%	100%	100%	99%	99%	99%
Honduras	91%	100%	100%	97%	88%	97%
Yemen	99%	99%	100%	96%	96%	96%
Benchmarking Participants						
Alberta, Canada	98%	99%	100%	96%	93%	95%
Ontario, Canada	97%	98%	100%	96%	93%	94%
Quebec, Canada	95%	96%	100%	95%	90%	91%
Abu Dhabi, UAE	99%	99%	100%	98%	97%	97%
Dubai, UAE	100%	100%	100%	96%	96%	96%
Florida, US	96%	96%	100%	95%	91%	91%
North Carolina, US	94%	94%	100%	95%	89%	89%

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Appendix C.9: Participation Rates (Weighted)

TIMSS 2011 Mathematics 8th Grade

Country	School Participation		Class Participation	Student Participation	Overall Participation	
	Before Replacement	After Replacement			Before Replacement	After Replacement
Armenia	100%	100%	100%	97%	97%	97%
Australia	96%	98%	100%	90%	87%	88%
Bahrain	99%	99%	100%	98%	97%	97%
Chile	88%	99%	100%	95%	84%	95%
Chinese Taipei	100%	100%	100%	99%	99%	99%
‡ England	75%	79%	100%	89%	67%	70%
Finland	97%	98%	100%	95%	91%	93%
Georgia	97%	98%	100%	98%	96%	97%
Ghana	100%	100%	100%	97%	97%	97%
Hong Kong SAR	77%	78%	100%	96%	74%	75%
Hungary	98%	99%	100%	96%	94%	95%
Indonesia	100%	100%	100%	96%	96%	96%
Iran, Islamic Rep. of	100%	100%	100%	99%	98%	99%
Israel	94%	100%	100%	92%	87%	92%
Italy	83%	97%	100%	96%	80%	93%
Japan	85%	92%	100%	94%	80%	87%
Jordan	100%	100%	100%	96%	96%	96%
Kazakhstan	99%	100%	100%	98%	98%	98%
Korea, Rep. of	100%	100%	100%	99%	99%	99%
Lebanon	90%	98%	100%	96%	87%	94%
Lithuania	92%	99%	100%	93%	85%	92%
Macedonia, Rep. of	100%	100%	100%	95%	95%	95%
Malaysia	100%	100%	100%	98%	98%	98%
Morocco	100%	100%	100%	94%	94%	94%
New Zealand	87%	98%	100%	90%	78%	88%
Norway	89%	89%	100%	94%	84%	84%
Oman	99%	99%	100%	98%	97%	97%
Palestinian Nat'l Auth.	100%	100%	100%	98%	98%	98%
Qatar	99%	99%	100%	99%	99%	99%
Romania	99%	100%	100%	99%	97%	99%
Russian Federation	100%	100%	100%	98%	98%	98%
Saudi Arabia	98%	100%	100%	98%	96%	98%
Singapore	100%	100%	100%	95%	95%	95%
Slovenia	96%	98%	100%	94%	91%	92%
Sweden	97%	98%	100%	94%	91%	92%
Syrian Arab Republic	99%	99%	100%	93%	92%	92%
Thailand	92%	100%	100%	99%	90%	99%
Tunisia	99%	99%	100%	97%	97%	97%
Turkey	99%	100%	100%	97%	96%	97%
Ukraine	98%	100%	100%	98%	97%	98%
United Arab Emirates	100%	100%	100%	97%	97%	97%
United States	87%	87%	100%	94%	81%	81%

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

TIMSS guidelines for sampling participation: The minimum acceptable participation rates were 85% of both schools and students, or a combined rate (the product of school and student participation) of 75%. Participants not meeting these guidelines were annotated as follows:

† Met guidelines for sample participation rates only after replacement schools were included.

‡ Nearly satisfied guidelines for sample participation rates after replacement schools were included.

‡ Did not satisfy guidelines for sample participation rates.

Appendix C.9: Participation Rates (Weighted) (Continued)

TIMSS 2011 Mathematics 8th Grade

Country	School Participation		Class Participation	Student Participation	Overall Participation	
	Before Replacement	After Replacement			Before Replacement	After Replacement
Ninth Grade Participants						
Botswana	100%	100%	100%	98%	98%	98%
Honduras	88%	100%	100%	96%	84%	96%
South Africa	100%	100%	100%	95%	94%	95%
Benchmarking Participants						
Alberta, Canada	91%	99%	100%	93%	85%	92%
Ontario, Canada	97%	98%	100%	95%	92%	93%
Quebec, Canada	96%	96%	99%	93%	88%	88%
Abu Dhabi, UAE	99%	99%	100%	97%	96%	96%
Dubai, UAE	99%	99%	100%	96%	95%	95%
Alabama, US	92%	92%	100%	92%	84%	84%
California, US	85%	88%	99%	94%	79%	82%
Colorado, US	84%	89%	100%	94%	79%	84%
Connecticut, US	100%	100%	100%	94%	94%	94%
Florida, US	94%	94%	98%	91%	84%	84%
Indiana, US	94%	97%	100%	96%	91%	93%
Massachusetts, US	100%	100%	100%	96%	96%	96%
Minnesota, US	91%	98%	100%	95%	86%	94%
North Carolina, US	98%	98%	100%	95%	93%	93%

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Appendix C.10: Trends in Student Populations

TIMSS 2011 Mathematics 4th Grade

Country	Years of Formal Schooling*				Average Age at Time of Testing				Overall Exclusion Rates				Overall Participation Rates (After Replacement)			
	2011	2007	2003	1995	2011	2007	2003	1995	2011	2007	2003	1995	2011	2007	2003	1995
[a] Armenia	4		4		10.0		10.9		2.0%		2.9%		98%		90%	
Australia	4	4	4	4 or 5	10.0	9.9	9.9	10.2	4.4%	4.0%	2.7%	1.8%	93%	95%	85%	66%
Austria	4	4		4	10.3	10.3		10.5	5.1%	5.0%		2.8%	98%	97%		69%
Belgium (Flemish)	4		4		10.0		10.0		5.0%		6.3%		92%		97%	
Chinese Taipei	4	4	4		10.2	10.2	10.2		1.4%	2.8%	3.1%		99%	100%	99%	
Czech Republic	4	4		4	10.4	10.3		10.4	5.1%	4.9%		4.1%	94%	92%		86%
Denmark	4	4			11.0	11.0			6.3%	4.1%			87%	85%		
England	5	5	5	5	10.2	10.2	10.3	10.0	2.0%	2.1%	1.9%	12.1%	78%	84%	76%	83%
[b] Georgia	4	4			10.0	10.1			4.9%	4.8%			96%	98%		
Germany	4	4			10.4	10.4			1.9%	1.3%			95%	96%		
Hong Kong SAR	4	4	4	4	10.1	10.2	10.2	10.1	8.5%	5.4%	3.8%	2.7%	82%	81%	83%	83%
Hungary	4	4	4	4	10.7	10.7	10.5	10.4	4.2%	4.4%	8.1%	3.8%	96%	96%	93%	92%
Iran, Islamic Rep. of	4	4	4	4	10.2	10.2	10.4	10.5	4.5%	3.0%	5.7%	1.3%	99%	99%	98%	97%
Ireland	4			4	10.3			10.3	2.5%			6.9%	95%			90%
Italy	4	4	4		9.7	9.8	9.8		3.7%	5.3%	4.2%		95%	97%	97%	
Japan	4	4	4	4	10.5	10.5	10.4	10.4	3.2%	1.1%	0.8%	3.0%	96%	95%	97%	92%
Korea, Rep. of	4			4	10.4			10.3	2.5%			6.6%	98%			95%
Lithuania	4	4	4		10.7	10.8	10.9		5.6%	5.4%	4.6%		94%	94%	87%	
Morocco	4	4	4		10.5	10.6	11.0		2.0%	1.4%	2.2%		96%	77%	81%	
Netherlands	4	4	4	4	10.2	10.2	10.2	10.3	4.0%	4.8%	5.2%	4.4%	79%	91%	84%	59%
New Zealand	4.5–5.5	4.5–5.5	4.5–5.5	4.5–5.5	9.9	10.0	10.0	10.0	4.9%	5.4%	4.0%	1.3%	90%	96%	93%	95%
Norway	4	4	3	3	9.7	9.8	9.8	9.9	4.3%	5.1%	4.4%	3.1%	70%	92%	88%	91%
Portugal	4			4	10.0			10.4	2.5%			7.3%	92%			92%
Russian Federation	4	4	3 or 4		10.8	10.8	10.6		5.3%	3.6%	6.8%		98%	98%	97%	
Singapore	4	4	4	4	10.4	10.4	10.3	10.3	6.3%	1.5%	0.0%	0.0%	96%	96%	98%	98%
Slovak Republic	4	4			10.4	10.4			4.6%	3.3%			96%	97%		
Slovenia	4	4	3 or 4	3	9.9	9.8	9.8	9.9	2.6%	2.1%	1.3%	1.9%	94%	93%	91%	76%
Sweden	4	4			10.7	10.8			4.1%	3.1%			91%	97%		
Tunisia	4	4	4		10.0	10.2	10.4		2.5%	2.9%	0.9%		99%	99%	99%	
United States	4	4	4	4	10.2	10.3	10.2	10.2	7.0%	9.2%	5.1%	4.7%	80%	84%	78%	80%
Yemen	4	4			11.2	11.2			3.7%	2.0%			95%	98%		
Benchmarking Participants																
Alberta, Canada	4	4		4	9.9	9.8		9.8	7.5%	7.6%		–	95%	94%		91%
Ontario, Canada	4	4	4	4	9.8	9.8	9.8	9.8	5.3%	6.3%	4.8%	–	94%	92%	90%	92%
Quebec, Canada	4	4	4	4	10.1	10.1	10.1	10.3	3.7%	6.4%	3.6%	–	91%	84%	91%	81%
Dubai, UAE	4	4			9.8	10.0			5.1%	5.4%			96%	67%		

* Represents years of schooling counting from the first year of ISCED Level 1.

a Age in 2011 lower due to educational reforms.

b Schools in South Ossetia and Abkhazia were excluded due to lack of access and absence of official statistics. Abkhazia refugee schools in other territories of Georgia were included in the sample frame.

A dash (–) indicates comparable data not available.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Appendix C.11: Trends in Student Populations

TIMSS 2011 8th Grade Mathematics

Country	Years of Formal Schooling*					Average Age at Time of Testing				
	2011	2007	2003	1999	1995	2011	2007	2003	1999	1995
[a] Armenia	9		8			14.6		14.9		
Australia	8	8	8		8 or 9	14.0	13.9	13.9		14.2
[c] Bahrain	8	8	8			14.4	14.1	14.1		
Chile	8		8	8		14.2		14.2	14.4	
Chinese Taipei	8	8	8	8		14.2	14.2	14.2	14.2	
England	9	9	9	9	9	14.2	14.2	14.3	14.2	14.0
Finland (Grade 7)	7			7		13.8			13.8	
[b] Georgia	8	8				14.2	14.2			
Ghana	8	8	8			15.8	15.8	15.5		
Hong Kong SAR	8	8	8	8	8	14.2	14.4	14.4	14.2	14.2
Hungary	8	8	8	8	8	14.7	14.6	14.5	14.4	14.3
Indonesia	8	8				14.3	14.3			
Iran, Islamic Rep. of	8	8	8	8	8	14.3	14.2	14.4	14.6	14.6
Italy	8	8	8	8		13.8	13.9	13.9	14.0	
Japan	8	8	8	8	8	14.5	14.5	14.4	14.4	14.4
Jordan	8	8	8	8		13.9	14.0	13.9	14.0	
[c] Korea, Rep. of	8	8	8	8	8	14.3	14.3	14.6	14.4	14.2
Lebanon	8	8	8			14.3	14.4	14.6		
[c] Lithuania	8	8	8	8.5	8	14.7	14.9	14.9	15.2	14.3
Macedonia, Rep. of	8		8	8		14.7		14.6	14.6	
Malaysia	8	8	8	8		14.4	14.3	14.3	14.4	
New Zealand	8.5–9.5		8.5–9.5	8.5–9.5	8.5–9.5	14.1		14.1	14.0	14.0
Norway	8	8	7		7	13.7	13.8	13.8		13.9
Oman	8	8				14.1	14.3			
Palestinian Nat'l Auth.	8	8	8			13.9	14.0	14.1		
Romania	8	8	8	8	8	14.9	15.0	15.0	14.8	14.6
Russian Federation	8	7 or 8	7 or 8	7 or 8	7 or 8	14.7	14.6	14.2	14.1	14.0
Singapore	8	8	8	8	8	14.4	14.4	14.3	14.4	14.5
Slovenia	8	7 or 8	7 or 8		7	13.9	13.8	13.8		13.8
Sweden	8	8	8		7	14.8	14.8	14.9		14.9
Syrian Arab Republic	8	8				13.9	13.9			
Thailand	8	8		8		14.3	14.3		14.5	
Tunisia	8	8	8	8		14.3	14.5	14.8	14.8	
Ukraine	8	8				14.2	14.2			
United States	8	8	8	8	8	14.2	14.3	14.2	14.2	14.2
Benchmarking Participants										
Alberta, Canada	8			8	8	13.9			13.9	14.0
Ontario, Canada	8	8	8	8	8	13.8	13.8	13.8	13.9	14.0
Quebec, Canada	8	8	8	8	8	14.2	14.2	14.2	14.3	14.5
[c] Dubai, UAE	8	8				13.9	14.2			
Connecticut, US	8			8		14.1			14.0	
Indiana, US	8		8	8		14.4		13.5	14.4	
Massachusetts, US	8	8		8		14.2	14.2		14.1	
Minnesota, US	8	8			8	14.3	14.3			14.3
North Carolina, US	8			8		14.2			14.2	

* Represents years of schooling counting from the first year of ISCED Level 1

a Age in 2011 lower due to educational reforms.

b Schools in South Ossetia and Abkhazia were excluded due to lack of access and absence of official statistics. Abkhazia refugee schools in other territories of Georgia were included in the sample frame.

c Bahrain in 2011, Korea in 2003, Lithuania in 1999, and Dubai (UAE) in 2007 tested the same cohort of students as other countries, but later in the assessment year.

A dash (–) indicates comparable data not available.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Appendix C.11: Trends in Student Populations (Continued)

Country	Overall Exclusion Rates					Overall Participation Rates (After Replacement)				
	2011	2007	2003	1999	1995	2011	2007	2003	1999	1995
[a] Armenia	1.5%		2.9%			97%		89%		
Australia	3.2%	1.9%	1.3%		0.8%	88%	93%	83%		70%
[c] Bahrain	1.6%	1.5%	0.0%			97%	97%	98%		
Chile	2.8%		2.2%	2.8%		95%		99%	96%	
Chinese Taipei	1.3%	3.3%	4.8%	1.6%		99%	99%	99%	99%	
England	2.2%	2.3%	2.1%	5.0%	11.3%	70%	75%	46%	77%	77%
Finland (Grade 7)	3.8%			3.7%		96%			96%	
[b] Georgia	4.5%	3.9%				97%	97%			
Ghana	0.6%	0.9%	0.9%			97%	98%	93%		
Hong Kong SAR	5.3%	3.8%	3.4%	0.8%	2.0%	75%	75%	80%	74%	81%
Hungary	4.4%	3.9%	8.5%	4.3%	3.8%	95%	96%	94%	93%	87%
Indonesia	3.2%	3.4%				96%	97%			
Iran, Islamic Rep. of	2.2%	0.5%	6.5%	4.4%	0.3%	99%	98%	98%	98%	98%
Italy	4.7%	5.0%	3.6%	6.7%		93%	96%	97%	97%	
Japan	2.8%	3.5%	0.6%	1.3%	0.6%	87%	91%	93%	89%	90%
Jordan	0.4%	2.0%	1.3%	3.0%		96%	96%	96%	99%	
[c] Korea, Rep. of	1.9%	1.6%	4.9%	4.0%	3.8%	99%	99%	98%	100%	95%
Lebanon	1.4%	1.4%	1.4%			94%	85%	91%		
[c] Lithuania	4.8%	4.2%	2.6%	4.5%	6.6%	92%	90%	84%	89%	83%
Macedonia, Rep. of	3.3%		12.5%	1.1%		95%		96%	98%	
Malaysia	0.1%	3.3%	4.0%	4.6%		98%	98%	98%	99%	
New Zealand	3.2%		4.4%	2.4%	1.7%	88%		90%	91%	94%
Norway	1.9%	2.6%	2.3%		2.2%	84%	86%	85%		93%
Oman	1.2%	1.2%				97%	99%			
Palestinian Nat'l Auth.	1.5%	1.0%	0.5%			98%	98%	99%		
Romania	1.3%	1.8%	0.5%	3.7%	2.8%	99%	97%	98%	97%	89%
Russian Federation	6.0%	2.3%	5.5%	1.7%	6.3%	98%	97%	96%	97%	95%
Singapore	6.0%	1.8%	0.0%	0.0%	4.6%	95%	95%	97%	98%	95%
Slovenia	2.3%	1.9%	1.4%		2.6%	92%	92%	91%		77%
Sweden	5.1%	3.6%	2.8%		0.9%	92%	94%	87%		90%
Syrian Arab Republic	1.9%	0.6%				92%	96%			
Thailand	1.5%	3.4%		3.3%		99%	99%		99%	
Tunisia	0.3%	0.0%	1.8%	0.1%		97%	98%	98%	98%	
Ukraine	2.8%	0.2%				98%	95%			
United States	7.2%	7.9%	4.9%	3.9%	2.1%	81%	77%	73%	85%	78%
Benchmarking Participants										
Alberta, Canada	7.4%			–	–	92%			95%	92%
Ontario, Canada	5.6%	6.2%	6.0%	5.1%	–	93%	89%	89%	93%	90%
Quebec, Canada	4.9%	13.6%	4.8%	1.3%	–	88%	77%	85%	92%	89%
[c] Dubai, UAE	4.0%	5.0%				95%	69%			
Connecticut, US	8.5%			5.0%		94%			90%	
Indiana, US	6.3%		7.8%	6.0%		93%		94%	79%	
Massachusetts, US	7.9%	8.4%		5.0%		96%	92%		93%	
Minnesota, US	4.3%	7.5%			–	94%	93%			–
North Carolina, US	11.4%			4.0%		93%			92%	

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Appendix D

Percentage of Students with Achievement Too Low for Estimation

Appendix D.1: Percentage of Students with Achievement Too Low for Estimation*

TIMSS 2011 4th Grade Mathematics

Country	Percentage of Students with Achievement Too Low for Estimation	Average Percent Correct
Armenia	8 (0.6)	40 (0.8)
Australia	3 (0.4)	54 (0.6)
Austria	1 (0.2)	52 (0.7)
Azerbaijan	7 (0.6)	44 (1.2)
Bahrain	9 (0.6)	37 (0.6)
Belgium (Flemish)	0 (0.1)	62 (0.5)
Chile	6 (0.4)	41 (0.5)
Chinese Taipei	0 (0.1)	71 (0.4)
Croatia	3 (0.3)	48 (0.4)
Czech Republic	2 (0.3)	52 (0.6)
Denmark	1 (0.3)	58 (0.6)
England	2 (0.3)	60 (0.8)
Finland	1 (0.2)	60 (0.6)
Georgia	9 (0.6)	40 (0.6)
Germany	1 (0.2)	57 (0.6)
Hong Kong SAR	0 (0.2)	74 (0.8)
Hungary	4 (0.4)	55 (0.7)
Iran, Islamic Rep. of	11 (0.6)	37 (0.7)
Ireland	2 (0.3)	56 (0.6)
Italy	2 (0.3)	52 (0.7)
Japan	0 (0.1)	70 (0.4)
Kazakhstan	3 (0.4)	52 (1.1)
Korea, Rep. of	0 (0.1)	74 (0.4)
♱ Kuwait	28 (0.9)	23 (0.4)
Lithuania	1 (0.2)	58 (0.6)
Malta	4 (0.3)	49 (0.3)
♱ Morocco	27 (0.8)	24 (0.6)
Netherlands	0 (0.2)	59 (0.4)
New Zealand	5 (0.4)	46 (0.5)
Northern Ireland	2 (0.3)	65 (0.6)
Norway	3 (0.5)	48 (0.7)
Ψ Oman	19 (0.7)	30 (0.4)
Poland	4 (0.4)	45 (0.5)
Portugal	1 (0.3)	59 (0.8)
Qatar	15 (0.7)	34 (0.6)
Romania	8 (1.1)	47 (1.2)
Russian Federation	1 (0.1)	61 (0.9)
Saudi Arabia	14 (1.0)	33 (0.9)
Serbia	4 (0.4)	54 (0.7)
Singapore	1 (0.1)	74 (0.7)
Slovak Republic	3 (0.5)	52 (0.8)
Slovenia	2 (0.3)	53 (0.5)
Spain	3 (0.4)	45 (0.6)
Sweden	2 (0.3)	50 (0.5)
Thailand	6 (0.9)	41 (1.0)
Ψ Tunisia	25 (1.2)	25 (0.5)
Turkey	6 (0.6)	45 (0.8)
United Arab Emirates	11 (0.4)	37 (0.4)
United States	1 (0.1)	60 (0.5)
♱ Yemen	48 (1.6)	16 (0.4)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

* Students were considered to have achievement too low for estimation if their performance on the assessment was no better than could be achieved by simply guessing on the multiple choice assessment items. However, such students were assigned scale scores (plausible values) by the achievement scaling procedure, despite concerns about their reliability.

♱ Average achievement not reliably measured because the percentage of students with achievement too low for estimation exceeds 25%.

Ψ Reservations about reliability of average achievement because the percentage of students with achievement too low for estimation does not exceed 25% but exceeds 15%.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Appendix D.1: Percentage of Students with Achievement Too Low for Estimation* (Continued)

Country	Percentage of Students with Achievement Too Low for Estimation	Average Percent Correct
Sixth Grade Participants		
Botswana	11 (0.6)	35 (0.7)
Ψ Honduras	17 (1.5)	29 (0.9)
Ж Yemen	26 (1.5)	24 (0.6)
Benchmarking Participants		
Alberta, Canada	2 (0.3)	51 (0.6)
Ontario, Canada	2 (0.3)	54 (0.8)
Quebec, Canada	0 (0.1)	58 (0.6)
Abu Dhabi, UAE	14 (1.0)	34 (0.8)
Dubai, UAE	8 (0.3)	44 (0.4)
Florida, US	1 (0.2)	61 (0.7)
North Carolina, US	1 (0.2)	63 (1.0)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Appendix D.2: Percentage of Students with Achievement Too Low for Estimation*

TIMSS 2011 8th Grade Mathematics

Country	Percentage of Students with Achievement Too Low for Estimation	Average Percent Correct
Armenia	11 (0.7)	38 (0.6)
Australia	4 (0.4)	48 (1.3)
Ψ Bahrain	19 (0.6)	29 (0.3)
Chile	15 (0.7)	29 (0.4)
Chinese Taipei	2 (0.2)	72 (0.6)
England	4 (0.7)	48 (1.4)
Finland	2 (0.3)	49 (0.7)
Georgia	15 (0.8)	33 (0.6)
Ж Ghana	33 (1.2)	19 (0.4)
Hong Kong SAR	2 (0.4)	68 (0.9)
Hungary	5 (0.6)	49 (0.8)
Ψ Indonesia	21 (1.2)	24 (0.6)
Ψ Iran, Islamic Rep. of	16 (0.8)	30 (0.8)
Israel	6 (0.5)	51 (1.0)
Italy	4 (0.5)	46 (0.6)
Japan	1 (0.2)	64 (0.6)
Ψ Jordan	18 (0.9)	29 (0.5)
Kazakhstan	7 (0.7)	43 (1.0)
Korea, Rep. of	1 (0.1)	74 (0.5)
Lebanon	8 (0.7)	34 (0.8)
Lithuania	5 (0.4)	47 (0.6)
Ψ Macedonia, Rep. of	19 (1.1)	32 (0.9)
Malaysia	12 (1.1)	34 (1.0)
Ж Morocco	27 (0.7)	22 (0.2)
New Zealand	6 (0.6)	44 (1.4)
Norway	5 (0.5)	39 (0.6)
Ψ Oman	25 (0.7)	24 (0.3)
Ψ Palestinian Nat'l Auth.	17 (0.7)	29 (0.6)
Ψ Qatar	19 (0.6)	30 (0.5)
Romania	12 (0.7)	38 (0.8)
Russian Federation	2 (0.3)	56 (0.9)
Ψ Saudi Arabia	19 (1.0)	26 (0.7)
Singapore	1 (0.1)	73 (0.9)
Slovenia	3 (0.3)	47 (0.5)
Sweden	5 (0.4)	41 (0.5)
Ψ Syrian Arab Republic	23 (1.1)	25 (0.6)
Thailand	13 (0.8)	31 (0.9)
Tunisia	14 (0.7)	29 (0.6)
Turkey	12 (0.6)	38 (0.8)
Ukraine	7 (0.6)	42 (0.9)
United Arab Emirates	9 (0.3)	37 (0.5)
United States	3 (0.3)	48 (0.7)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

* Students were considered to have achievement too low for estimation if their performance on the assessment was no better than could be achieved by simply guessing on the multiple choice assessment items. However, such students were assigned scale scores (plausible values) by the achievement scaling procedure, despite concerns about their reliability.

Ж Average achievement not reliably measured because the percentage of students with achievement too low for estimation exceeds 25%.

Ψ Reservations about reliability of average achievement because the percentage of students with achievement too low for estimation does not exceed 25% but exceeds 15%.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Appendix D.2: Percentage of Students with Achievement Too Low for Estimation* (Continued)

Country	Percentage of Students with Achievement Too Low for Estimation	Average Percent Correct
Ninth Grade Participants		
Ψ Botswana	19 (0.6)	25 (0.4)
ж Honduras	39 (1.3)	17 (0.5)
ж South Africa	32 (0.9)	20 (0.4)
Benchmarking Participants		
Alberta, Canada	3 (0.4)	47 (0.7)
Ontario, Canada	3 (0.4)	49 (0.6)
Quebec, Canada	1 (0.2)	54 (0.7)
Abu Dhabi, UAE	10 (0.7)	35 (0.8)
Dubai, UAE	8 (0.5)	42 (0.5)
Alabama, US	8 (1.0)	38 (1.4)
California, US	4 (0.6)	45 (1.2)
Colorado, US	2 (0.4)	51 (1.2)
Connecticut, US	4 (0.6)	51 (1.3)
Florida, US	3 (0.7)	49 (1.7)
Indiana, US	2 (0.5)	51 (1.4)
Massachusetts, US	1 (0.3)	62 (1.5)
Minnesota, US	1 (0.3)	58 (1.3)
North Carolina, US	2 (0.4)	55 (1.8)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Appendix E

Average Percent Correct in the Mathematics Content and Cognitive Domains

Appendix E.1: Average Percent Correct in the Mathematics Content and Cognitive Domains

TIMSS 2011 Mathematics 4th Grade

Country	Overall Mathematics	Mathematics Content Domains			Mathematics Cognitive Domains		
		Number	Geometric Shapes and Measures	Data Display	Knowing	Applying	Reasoning
Armenia	40 (0.8)	44 (0.8)	37 (0.8)	36 (0.9)	48 (0.8)	38 (0.8)	29 (0.7)
Australia	54 (0.6)	48 (0.7)	58 (0.6)	64 (0.7)	58 (0.7)	55 (0.7)	44 (0.6)
Austria	52 (0.7)	47 (0.6)	53 (0.9)	64 (0.8)	56 (0.7)	51 (0.8)	43 (0.7)
Azerbaijan	44 (1.2)	46 (1.3)	41 (1.3)	40 (1.3)	51 (1.2)	42 (1.4)	32 (1.1)
Bahrain	37 (0.6)	34 (0.6)	37 (0.6)	48 (0.9)	43 (0.6)	36 (0.6)	28 (0.6)
Belgium (Flemish)	62 (0.5)	59 (0.6)	62 (0.5)	69 (0.7)	69 (0.5)	62 (0.6)	46 (0.6)
Chile	41 (0.5)	37 (0.5)	42 (0.6)	53 (0.7)	45 (0.5)	41 (0.5)	33 (0.5)
Chinese Taipei	71 (0.4)	71 (0.4)	65 (0.5)	82 (0.5)	75 (0.4)	72 (0.4)	59 (0.6)
Croatia	48 (0.4)	45 (0.4)	48 (0.5)	58 (0.6)	55 (0.5)	46 (0.5)	38 (0.5)
Czech Republic	52 (0.6)	48 (0.6)	53 (0.7)	65 (0.8)	55 (0.6)	53 (0.7)	46 (0.8)
Denmark	58 (0.6)	54 (0.7)	61 (0.6)	68 (0.7)	61 (0.6)	60 (0.7)	50 (0.7)
England	60 (0.8)	56 (0.9)	62 (0.8)	71 (0.8)	66 (0.8)	61 (0.9)	49 (0.8)
Finland	60 (0.6)	57 (0.6)	59 (0.6)	73 (0.7)	63 (0.6)	60 (0.7)	52 (0.7)
Georgia	40 (0.6)	41 (0.6)	36 (0.6)	46 (0.9)	45 (0.7)	39 (0.6)	30 (0.6)
Germany	57 (0.6)	51 (0.6)	59 (0.6)	72 (0.7)	60 (0.6)	58 (0.6)	48 (0.7)
Hong Kong SAR	74 (0.8)	73 (0.8)	74 (0.7)	81 (0.8)	80 (0.7)	75 (0.9)	61 (0.8)
Hungary	55 (0.7)	51 (0.8)	56 (0.8)	63 (0.9)	60 (0.8)	54 (0.8)	45 (0.8)
Iran, Islamic Rep. of	37 (0.7)	34 (0.6)	40 (0.7)	39 (0.8)	43 (0.7)	36 (0.7)	26 (0.6)
Ireland	56 (0.6)	54 (0.7)	56 (0.6)	67 (0.8)	63 (0.6)	57 (0.7)	42 (0.8)
Italy	52 (0.7)	49 (0.7)	53 (0.7)	59 (0.8)	58 (0.7)	52 (0.8)	41 (0.7)
Japan	70 (0.4)	67 (0.4)	68 (0.4)	82 (0.4)	74 (0.4)	70 (0.4)	63 (0.5)
Kazakhstan	52 (1.1)	52 (1.1)	50 (1.1)	56 (1.3)	57 (1.0)	51 (1.2)	41 (1.1)
Korea, Rep. of	74 (0.4)	73 (0.4)	72 (0.4)	84 (0.4)	79 (0.4)	74 (0.4)	65 (0.5)
‡ Kuwait	23 (0.4)	20 (0.4)	25 (0.4)	30 (0.6)	29 (0.5)	22 (0.4)	16 (0.3)
Lithuania	58 (0.6)	56 (0.7)	58 (0.6)	68 (0.6)	61 (0.6)	60 (0.6)	49 (0.7)
Malta	49 (0.3)	46 (0.3)	49 (0.4)	61 (0.5)	56 (0.4)	50 (0.4)	35 (0.4)
‡ Morocco	24 (0.6)	21 (0.6)	28 (0.6)	21 (0.6)	28 (0.6)	22 (0.7)	18 (0.5)
Netherlands	59 (0.4)	57 (0.5)	54 (0.5)	74 (0.6)	61 (0.4)	60 (0.5)	51 (0.6)
New Zealand	46 (0.5)	42 (0.6)	47 (0.5)	59 (0.7)	49 (0.6)	47 (0.6)	39 (0.5)
Northern Ireland	65 (0.6)	63 (0.7)	65 (0.6)	73 (0.6)	71 (0.7)	66 (0.7)	49 (0.7)
Norway	48 (0.7)	43 (0.7)	52 (0.8)	60 (0.7)	51 (0.6)	50 (0.8)	41 (0.7)
Ψ Oman	30 (0.4)	27 (0.4)	31 (0.4)	36 (0.6)	35 (0.4)	28 (0.5)	21 (0.4)
Poland	45 (0.5)	42 (0.5)	45 (0.5)	58 (0.6)	49 (0.6)	45 (0.5)	38 (0.5)
Portugal	59 (0.8)	53 (0.9)	61 (0.7)	72 (0.7)	63 (0.7)	60 (0.9)	48 (0.9)
Qatar	34 (0.6)	32 (0.6)	34 (0.7)	43 (0.7)	39 (0.7)	33 (0.6)	26 (0.6)
Romania	47 (1.2)	47 (1.2)	46 (1.1)	52 (1.3)	53 (1.2)	47 (1.2)	39 (1.1)
Russian Federation	61 (0.9)	59 (0.9)	60 (0.9)	68 (0.9)	65 (0.8)	60 (1.0)	51 (0.9)
Saudi Arabia	33 (0.9)	30 (1.0)	34 (0.9)	39 (1.1)	39 (1.0)	31 (1.0)	24 (0.9)
Serbia	54 (0.7)	54 (0.7)	50 (0.7)	61 (0.9)	60 (0.7)	53 (0.8)	45 (0.7)
Singapore	74 (0.7)	76 (0.8)	70 (0.7)	80 (0.6)	81 (0.6)	75 (0.7)	61 (0.9)
Slovak Republic	52 (0.8)	50 (0.9)	50 (0.8)	62 (0.8)	56 (0.8)	52 (0.9)	43 (0.9)
Slovenia	53 (0.5)	47 (0.6)	57 (0.5)	68 (0.6)	57 (0.5)	54 (0.5)	44 (0.7)
Spain	45 (0.6)	43 (0.7)	44 (0.7)	56 (0.7)	50 (0.7)	45 (0.7)	35 (0.6)
Sweden	50 (0.5)	45 (0.6)	49 (0.5)	67 (0.7)	50 (0.5)	51 (0.5)	45 (0.6)
Thailand	41 (1.0)	38 (1.0)	39 (0.9)	53 (1.3)	45 (1.1)	40 (1.1)	32 (0.9)
Ψ Tunisia	25 (0.5)	25 (0.5)	25 (0.5)	23 (0.8)	31 (0.6)	23 (0.5)	16 (0.4)
Turkey	45 (0.8)	43 (0.9)	43 (0.8)	57 (0.9)	51 (0.9)	45 (0.9)	33 (0.7)
United Arab Emirates	37 (0.4)	35 (0.4)	37 (0.4)	46 (0.4)	43 (0.4)	36 (0.4)	28 (0.4)
United States	60 (0.5)	57 (0.5)	59 (0.5)	71 (0.4)	67 (0.5)	60 (0.5)	46 (0.5)
‡ Yemen	16 (0.4)	16 (0.5)	16 (0.5)	16 (0.6)	19 (0.6)	15 (0.5)	11 (0.3)
International Avg.	50 (0.1)	47 (0.1)	49 (0.1)	58 (0.1)	55 (0.1)	50 (0.1)	40 (0.1)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

‡ Average achievement not reliably measured because the percentage of students with achievement too low for estimation exceeds 25%.

Ψ Reservations about reliability of average achievement because the percentage of students with achievement too low for estimation does not exceed 25% but exceeds 15%.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Appendix E.1: Average Percent Correct in the Mathematics Content and Cognitive Domains (Continued)

Country	Overall Mathematics	Mathematics Content Domains			Mathematics Cognitive Domains		
		Number	Geometric Shapes and Measures	Data Display	Knowing	Applying	Reasoning
Sixth Grade Participants							
Botswana	35 (0.7)	32 (0.7)	35 (0.7)	45 (0.9)	41 (0.8)	34 (0.8)	22 (0.6)
Ψ Honduras	29 (0.9)	28 (1.0)	27 (0.8)	35 (1.3)	32 (1.0)	29 (1.0)	23 (0.8)
Ж Yemen	24 (0.6)	23 (0.6)	22 (0.5)	29 (0.9)	27 (0.7)	23 (0.7)	18 (0.5)
Benchmarking Participants							
Alberta, Canada	51 (0.6)	46 (0.7)	50 (0.6)	67 (0.7)	53 (0.7)	52 (0.7)	43 (0.7)
Ontario, Canada	54 (0.8)	47 (0.8)	59 (0.8)	69 (0.8)	57 (0.7)	56 (0.8)	46 (0.9)
Quebec, Canada	58 (0.6)	54 (0.7)	58 (0.6)	70 (0.7)	63 (0.6)	57 (0.7)	48 (0.9)
Abu Dhabi, UAE	34 (0.8)	32 (0.8)	34 (0.9)	42 (0.9)	40 (1.0)	33 (0.9)	25 (0.8)
Dubai, UAE	44 (0.4)	42 (0.4)	42 (0.4)	54 (0.5)	50 (0.4)	43 (0.4)	34 (0.4)
Florida, US	61 (0.7)	59 (0.8)	62 (0.8)	71 (0.6)	70 (0.7)	61 (0.8)	45 (0.9)
North Carolina, US	63 (1.0)	63 (0.9)	59 (1.3)	74 (1.1)	71 (1.1)	64 (1.0)	47 (1.2)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Appendix E.2: Average Percent Correct in the Mathematics Content and Cognitive Domains

TIMSS 2011 Mathematics 8th Grade

Country	Overall Mathematics	Mathematics Content Domains				Mathematics Cognitive Domains		
		Number	Algebra	Geometry	Data and Chance	Knowing	Applying	Reasoning
Armenia	38 (0.6)	43 (0.6)	41 (0.6)	35 (0.7)	31 (0.6)	50 (0.7)	36 (0.6)	26 (0.5)
Australia	48 (1.3)	52 (1.4)	38 (1.4)	45 (1.3)	59 (1.2)	57 (1.3)	47 (1.3)	36 (1.3)
Ψ Bahrain	29 (0.3)	29 (0.3)	27 (0.4)	27 (0.4)	36 (0.4)	37 (0.4)	27 (0.3)	21 (0.4)
Chile	29 (0.4)	30 (0.5)	22 (0.4)	28 (0.5)	37 (0.5)	34 (0.5)	29 (0.4)	20 (0.4)
Chinese Taipei	72 (0.6)	72 (0.6)	72 (0.7)	73 (0.6)	69 (0.6)	77 (0.6)	72 (0.6)	63 (0.7)
England	48 (1.4)	53 (1.6)	39 (1.4)	45 (1.4)	61 (1.4)	57 (1.4)	48 (1.5)	37 (1.6)
Finland	49 (0.7)	56 (0.7)	39 (0.7)	45 (0.7)	61 (0.7)	58 (0.6)	50 (0.7)	37 (0.7)
Georgia	33 (0.6)	35 (0.7)	33 (0.7)	30 (0.7)	34 (0.6)	43 (0.8)	31 (0.6)	22 (0.6)
Ж Ghana	19 (0.4)	18 (0.5)	18 (0.5)	17 (0.5)	21 (0.4)	25 (0.6)	17 (0.4)	12 (0.4)
Hong Kong SAR	68 (0.9)	72 (0.9)	64 (1.0)	69 (0.9)	68 (0.8)	77 (0.8)	67 (0.9)	56 (1.0)
Hungary	49 (0.8)	53 (0.9)	42 (0.8)	47 (0.9)	56 (0.7)	59 (0.9)	47 (0.8)	36 (0.8)
Ψ Indonesia	24 (0.6)	24 (0.7)	22 (0.5)	24 (0.6)	29 (0.7)	31 (0.7)	23 (0.6)	17 (0.4)
Ψ Iran, Islamic Rep. of	30 (0.8)	29 (0.8)	27 (0.8)	33 (0.9)	32 (0.7)	37 (0.9)	28 (0.8)	23 (0.7)
Israel	51 (1.0)	55 (1.0)	48 (1.1)	45 (1.0)	56 (0.9)	60 (1.0)	50 (1.0)	40 (1.0)
Italy	46 (0.6)	49 (0.7)	39 (0.6)	48 (0.7)	52 (0.6)	55 (0.7)	45 (0.6)	34 (0.6)
Japan	64 (0.6)	63 (0.7)	60 (0.7)	67 (0.7)	68 (0.6)	70 (0.6)	64 (0.6)	56 (0.7)
Ψ Jordan	29 (0.5)	27 (0.6)	29 (0.6)	28 (0.6)	31 (0.6)	37 (0.7)	26 (0.5)	21 (0.5)
Kazakhstan	43 (1.0)	43 (1.1)	43 (1.2)	43 (1.1)	40 (1.0)	53 (1.1)	41 (1.1)	31 (1.1)
Korea, Rep. of	74 (0.5)	77 (0.5)	71 (0.7)	71 (0.6)	75 (0.5)	80 (0.5)	73 (0.6)	65 (0.6)
Lebanon	34 (0.8)	37 (0.9)	35 (0.9)	33 (0.9)	31 (0.8)	47 (1.0)	31 (0.8)	21 (0.8)
Lithuania	47 (0.6)	49 (0.7)	40 (0.7)	46 (0.7)	54 (0.6)	56 (0.6)	47 (0.6)	32 (0.6)
Ψ Macedonia, Rep. of	32 (0.9)	32 (1.0)	32 (1.0)	33 (1.1)	33 (0.9)	41 (1.1)	31 (0.9)	23 (0.9)
Malaysia	34 (1.0)	39 (1.3)	28 (0.9)	33 (1.1)	38 (0.9)	44 (1.2)	33 (1.0)	23 (0.9)
Ж Morocco	22 (0.2)	23 (0.3)	19 (0.3)	24 (0.4)	24 (0.3)	28 (0.3)	22 (0.3)	14 (0.2)
New Zealand	44 (1.4)	48 (1.7)	35 (1.3)	41 (1.3)	56 (1.3)	52 (1.5)	43 (1.3)	33 (1.3)
Norway	39 (0.6)	47 (0.8)	25 (0.5)	36 (0.7)	55 (0.7)	47 (0.6)	40 (0.6)	28 (0.6)
Ψ Oman	24 (0.3)	23 (0.4)	23 (0.4)	25 (0.3)	27 (0.4)	31 (0.4)	22 (0.3)	17 (0.3)
Ψ Palestinian Nat'l Auth.	29 (0.6)	29 (0.7)	27 (0.6)	30 (0.7)	30 (0.5)	37 (0.7)	27 (0.5)	20 (0.6)
Ψ Qatar	30 (0.5)	32 (0.6)	29 (0.6)	27 (0.5)	34 (0.6)	39 (0.6)	28 (0.5)	21 (0.5)
Romania	38 (0.8)	38 (0.9)	38 (1.0)	36 (0.9)	38 (0.7)	48 (1.0)	36 (0.8)	27 (0.8)
Russian Federation	56 (0.9)	58 (0.9)	56 (1.1)	54 (1.0)	54 (0.8)	67 (0.9)	55 (1.0)	42 (1.0)
Ψ Saudi Arabia	26 (0.7)	28 (0.9)	24 (0.7)	24 (0.7)	31 (0.8)	35 (0.9)	24 (0.7)	18 (0.6)
Singapore	73 (0.9)	77 (0.9)	72 (1.1)	71 (1.0)	72 (0.9)	82 (0.8)	73 (1.0)	62 (1.1)
Slovenia	47 (0.5)	52 (0.6)	38 (0.6)	46 (0.6)	55 (0.5)	57 (0.6)	45 (0.5)	35 (0.7)
Sweden	41 (0.5)	50 (0.5)	31 (0.5)	35 (0.5)	53 (0.6)	50 (0.5)	42 (0.5)	29 (0.5)
Ψ Syrian Arab Republic	25 (0.6)	24 (0.6)	24 (0.7)	25 (0.8)	26 (0.6)	31 (0.7)	24 (0.6)	17 (0.6)
Thailand	31 (0.9)	33 (1.0)	27 (0.9)	29 (0.9)	38 (0.8)	38 (1.0)	30 (0.8)	22 (0.8)
Tunisia	29 (0.6)	32 (0.7)	25 (0.5)	29 (0.6)	32 (0.7)	37 (0.7)	28 (0.6)	20 (0.5)
Turkey	38 (0.8)	36 (0.8)	35 (0.9)	37 (0.8)	47 (0.7)	44 (0.8)	37 (0.8)	30 (0.8)
Ukraine	42 (0.9)	43 (1.0)	39 (1.0)	41 (1.0)	45 (0.8)	52 (1.0)	41 (0.9)	29 (0.8)
United Arab Emirates	37 (0.5)	40 (0.5)	34 (0.5)	32 (0.5)	41 (0.4)	48 (0.5)	33 (0.5)	25 (0.4)
United States	48 (0.7)	53 (0.7)	43 (0.7)	41 (0.7)	58 (0.6)	61 (0.7)	46 (0.7)	35 (0.7)
International Avg.	41 (0.1)	43 (0.1)	37 (0.1)	39 (0.1)	45 (0.1)	49 (0.1)	39 (0.1)	30 (0.1)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Ж Average achievement not reliably measured because the percentage of students with achievement too low for estimation exceeds 25%.

Ψ Reservations about reliability of average achievement because the percentage of students with achievement too low for estimation does not exceed 25% but exceeds 15%.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

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Appendix E.2: Average Percent Correct in the Mathematics Content and Cognitive Domains (Continued)

Country	Overall Mathematics	Mathematics Content Domains				Mathematics Cognitive Domains		
		Number	Algebra	Geometry	Data and Chance	Knowing	Applying	Reasoning
Ninth Grade Participants								
Ψ Botswana	25 (0.4)	27 (0.5)	21 (0.4)	23 (0.4)	31 (0.5)	34 (0.5)	23 (0.4)	17 (0.4)
Ж Honduras	17 (0.5)	19 (0.6)	15 (0.5)	14 (0.3)	22 (0.6)	22 (0.6)	17 (0.4)	11 (0.4)
Ж South Africa	20 (0.4)	21 (0.4)	18 (0.4)	18 (0.3)	25 (0.4)	26 (0.5)	19 (0.3)	14 (0.3)
Benchmarking Participants								
Alberta, Canada	47 (0.7)	56 (0.8)	35 (0.7)	41 (0.7)	58 (0.8)	56 (0.7)	46 (0.7)	36 (0.8)
Ontario, Canada	49 (0.6)	55 (0.7)	39 (0.6)	48 (0.7)	59 (0.7)	57 (0.7)	48 (0.6)	40 (0.7)
Quebec, Canada	54 (0.7)	61 (0.8)	44 (0.8)	51 (0.7)	62 (0.7)	64 (0.7)	54 (0.7)	40 (0.7)
Abu Dhabi, UAE	35 (0.8)	39 (0.9)	32 (0.9)	31 (0.8)	39 (0.8)	47 (0.9)	32 (0.9)	24 (0.8)
Dubai, UAE	42 (0.5)	45 (0.6)	39 (0.6)	36 (0.6)	46 (0.5)	54 (0.5)	39 (0.6)	29 (0.6)
Alabama, US	38 (1.4)	41 (1.8)	33 (1.3)	33 (1.1)	49 (1.5)	50 (1.5)	36 (1.4)	26 (1.4)
California, US	45 (1.2)	48 (1.4)	43 (1.4)	35 (1.1)	51 (1.2)	58 (1.2)	41 (1.3)	30 (1.2)
Colorado, US	51 (1.2)	55 (1.3)	43 (1.3)	46 (1.3)	61 (1.2)	61 (1.2)	49 (1.2)	38 (1.3)
Connecticut, US	51 (1.3)	56 (1.4)	43 (1.5)	43 (1.1)	61 (1.4)	63 (1.3)	48 (1.4)	37 (1.3)
Florida, US	49 (1.7)	53 (1.8)	42 (1.7)	44 (1.6)	58 (1.8)	62 (1.6)	46 (1.9)	35 (1.7)
Indiana, US	51 (1.4)	57 (1.5)	45 (1.6)	44 (1.4)	61 (1.3)	65 (1.4)	49 (1.5)	36 (1.5)
Massachusetts, US	62 (1.5)	67 (1.5)	56 (1.8)	56 (1.5)	69 (1.4)	73 (1.3)	59 (1.6)	50 (1.8)
Minnesota, US	58 (1.3)	65 (1.3)	51 (1.5)	49 (1.4)	66 (1.3)	70 (1.1)	55 (1.5)	43 (1.6)
North Carolina, US	55 (1.8)	61 (1.8)	50 (2.1)	48 (1.7)	62 (1.5)	67 (1.7)	53 (1.9)	41 (1.8)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Appendix F

The Test-Curriculum Matching Analysis—Mathematics

TIMSS went to great lengths to ensure that comparisons of student achievement across countries would be as fair and equitable as possible. The TIMSS 2011 Assessment Frameworks were designed to specify the important aspects of mathematics that participating countries agreed should be the focus of an international assessment of mathematics achievement, and the assessment items were developed through a collaborative process with national representatives to faithfully represent the specifications in the frameworks and field tested extensively in participating countries. Finalizing the TIMSS 2011 assessments involved a series of reviews by representatives of the participating countries, experts in mathematics, and testing specialists. At the end of this process, the National Research Coordinators (NRCs) from each country formally approved the TIMSS 2011 assessments, thus accepting them as being sufficiently fair to compare their students' mathematics achievement with that of students from other countries.

Although the assessments were developed to represent an agreed-upon framework and were intended to have as much in common across countries as possible, it was unavoidable that the match between the TIMSS 2011 assessment (or test) and the mathematics curriculum would not be the same in all countries. To restrict test items to just those topics included in the curricula of all participating countries and covered in the same sequence would severely limit test coverage and restrict the research questions that the study is designed to address. The tests, therefore, inevitably have some items measuring topics unfamiliar to some students in some countries.

The Test-Curriculum Matching Analysis (TCMA) was conducted to investigate the extent to which the TIMSS 2011 mathematics assessment was relevant to each country's curriculum. The TCMA also investigates the impact on a country's performance of including only achievement items that were judged to be relevant to its own curriculum.[1]

To gather data about the extent to which the TIMSS 2011 tests were relevant to the curricula of the TIMSS countries and benchmarking participants, NRCs were asked to examine each achievement item and indicate whether the item was in their country's intended curriculum at the grade tested (fourth or eighth grade). The NRCs were asked to choose persons very familiar with the curriculum at these grades to make this determination. In some countries, the curriculum was prescribed for a range of grades and was not explicit about what was to be covered by the end of the fourth or eighth grades. For example, in Sweden the curriculum specifies the curricular goals to be achieved by the end of

1 Because there also may be curriculum areas covered in some countries that are not covered by the TIMSS 2011 tests, the TCMA does not provide complete information about how well the tests cover the curricula of the countries.

the fifth and ninth grades, but does not provide a grade-by-grade specification. In such situations, coordinators were asked to make the best judgment possible.[2] Because an item might be in the curriculum for some but not all students in a country, NRCs were asked to consider an item included if it was in the intended curriculum for more than 50 percent of the students. All TIMSS 2011 participants took part in the TCMA analysis except Bahrain, Georgia, Saudi Arabia, Honduras (sixth grade participant) and the US benchmarking states at the fourth grade, and Bahrain, Georgia, Ghana, Indonesia, Saudi Arabia, Syrian Arab Republic, Honduras (ninth grade partipant), and the US benchmarking states at the eighth grade.

Exhibits F.1 through F.4 present the TCMA results for the TIMSS 2011 mathematics test at fourth and eighth grades. Exhibits F.1 and F.2 show the average percent correct on the mathematics items judged appropriate by each country at the fourth and eighth grades, respectively. Exhibits F.3 and F.4 show the standard errors corresponding to the percentages presented in Exhibits F.1 and F.2.

In Exhibit F.1, the bottom row of the exhibit shows the number of items, in terms of score points, identified as appropriate in each country. At the fourth grade, the maximum number of score points in the assessment was 184 points.[3] Generally, the proportion of items judged appropriate was fairly high. Reading along the bottom row, it can be seen that two of the 47 countries that took part in the TCMA analysis judged 100 percent of the items to be included in their curricula. Another 38 countries and all of the sixth grade and benchmarking participants judged 75 percent or more (138 score points) to be appropriate. Only the Russian Federation judged less than half of the mathematics items to be included in their curricula.

At the eighth grade, the percentage of items judged appropriate was somewhat higher; four of the 36 countries and one of the five benchmarking participants judged 100 percent of the items to be appropriate (all 230 score points), and an additional 30 countries, two ninth grade, and four benchmarking participants judged 75 percent or more (173 score points) to be appropriate. For all participants, the majority of the eighth grade mathematics items were judged to be appropriate to their curricula.

Because most countries indicated that at least some items were not included in their intended curriculum at the grade tested, the data were

2 Exhibit 5 of the *TIMSS 2011 Encyclopedia* provides information on the grade-to-grade structure of the curriculum for each TIMSS 2011 participant.

3 The TIMSS 2011 fourth grade mathematics assessment contained 175 items, yielding 185 score points. However, following item review, response categories for one of the items were combined, resulting in data for 184 score points. Similarly, following item review, the 217 items and 232 score points in the eighth grade assessment were reduced to 230 score points.

Appendix F.1: Average Percent Correct for the Test-Curriculum Matching Analysis

TIMSS 2011 Mathematics 4th Grade

Based on a subset of items specifically identified by each country as addressing its curriculum

Read across the row to compare that country's performance based on the test items included by each of the countries across the top. Read down the column under a country name to compare the performance of the country down the left on the items included by the country listed on the top. Read along the diagonal to compare performance for each different country based on its own decisions about the test items to include.

Country	Average Percent Correct on All Items	Singapore	Korea, Rep. of	Hong Kong SAR	Chinese Taipei	Japan	Northern Ireland	Belgium (Flemish)	Russian Federation	England	United States	Finland	Denmark	Netherlands	Portugal	Lithuania	Germany	Ireland	Hungary	Australia	Serbia	Slovenia	Czech Republic	Italy	Slovak Republic	Austria	Kazakhstan	Sweden	Malta	Norway	Croatia
Singapore	74 (0.7)	75	74	74	75	74	75	74	73	75	76	76	75	74	75	73	74	74	74	74	75	75	73	75	74	74	72	74	75	74	72
Korea, Rep. of	74 (0.4)	75	77	73	77	77	74	75	75	74	77	76	75	74	75	74	75	74	75	75	76	75	74	75	77	77	75	76	74	74	75
Hong Kong SAR	74 (0.8)	75	74	74	75	74	75	74	72	74	76	75	75	75	75	73	74	74	75	74	75	75	74	75	74	75	72	74	75	74	73
Chinese Taipei	71 (0.4)	71	73	70	74	74	72	73	72	71	73	72	71	71	71	71	71	71	71	72	73	71	70	71	73	74	71	74	70	71	71
Japan	70 (0.4)	70	72	69	73	74	70	71	70	70	72	71	70	70	70	71	71	69	71	71	72	70	70	71	72	73	70	72	70	70	70
Northern Ireland	65 (0.6)	65	63	64	65	64	66	65	60	65	67	65	66	66	65	64	65	64	65	65	66	65	64	65	64	65	62	65	66	65	62
Belgium (Flemish)	62 (0.5)	62	61	61	63	61	62	63	59	62	64	63	62	62	62	60	62	61	62	62	63	63	61	62	63	63	60	63	62	62	61
Russian Federation	61 (0.9)	60	61	60	62	62	61	61	65	61	63	62	61	62	61	61	63	60	63	60	63	62	63	61	65	64	63	62	61	61	63
England	60 (0.8)	60	58	59	59	59	61	59	55	60	62	61	61	61	61	59	62	59	61	60	61	61	60	61	60	61	57	60	61	60	58
United States	60 (0.5)	60	59	59	60	59	61	60	56	60	62	61	60	60	60	59	60	60	61	60	62	61	60	60	61	61	58	60	61	60	58
Finland	60 (0.6)	59	59	58	60	59	61	60	55	60	62	61	61	61	60	59	61	59	60	61	62	61	60	60	62	62	58	62	60	60	58
Denmark	59 (0.6)	58	58	57	58	58	59	59	55	59	60	59	60	59	59	57	60	57	59	59	59	59	59	59	60	60	57	60	58	59	58
Netherlands	59 (0.4)	58	59	57	59	59	59	59	57	59	61	60	60	61	59	58	60	57	59	60	61	60	59	59	62	62	58	61	59	59	59
Portugal	59 (0.8)	58	58	56	58	59	59	58	57	59	60	59	59	59	59	58	62	58	60	59	59	59	60	59	60	61	58	59	58	59	59
Lithuania	58 (0.6)	57	58	56	58	59	58	58	58	58	60	59	59	60	59	59	60	57	60	59	60	59	59	59	60	61	58	59	58	58	58
Germany	57 (0.6)	56	55	54	55	57	57	57	56	57	59	57	58	58	57	57	61	56	58	57	58	59	60	58	60	60	57	57	57	57	58
Ireland	56 (0.6)	56	55	55	57	56	57	56	52	57	58	57	57	57	57	56	57	56	57	57	58	57	55	57	57	57	53	57	57	57	54
Hungary	55 (0.7)	54	54	53	54	54	55	55	55	55	56	55	56	55	55	54	57	54	57	54	57	57	57	55	57	58	56	56	55	55	55
Australia	54 (0.6)	53	52	52	53	53	55	53	48	54	55	55	55	55	54	53	55	53	55	54	55	55	54	55	55	55	52	55	54	54	53
Serbia	54 (0.7)	54	55	53	56	56	55	55	57	54	56	54	55	55	54	55	56	54	56	55	58	56	56	55	57	58	56	56	54	54	57
Slovenia	53 (0.5)	52	52	51	52	52	54	53	50	53	55	54	54	54	53	53	57	52	56	53	55	56	56	54	56	57	53	54	54	53	53
Czech Republic	52 (0.6)	51	53	50	52	52	53	53	54	52	54	53	53	53	53	52	56	51	55	52	55	55	56	53	57	57	55	54	52	53	55
Italy	52 (0.7)	51	52	50	53	52	52	52	50	52	54	53	52	51	52	51	54	51	53	52	53	53	53	53	54	54	51	53	52	52	52
Slovak Republic	52 (0.8)	51	53	50	53	53	52	52	55	52	54	53	53	53	52	52	55	51	53	52	55	54	54	52	57	56	54	53	51	52	54
Austria	52 (0.7)	51	51	49	51	52	52	52	53	52	54	52	52	53	52	52	56	51	53	52	54	53	54	52	55	56	53	53	52	52	53
Kazakhstan	52 (1.1)	52	52	51	52	52	52	52	56	52	53	52	52	52	52	51	53	52	53	51	53	53	53	52	54	54	53	52	51	52	53
Sweden	50 (0.5)	49	51	48	51	51	50	50	50	50	52	51	51	51	50	50	53	49	51	51	52	51	52	51	54	54	50	53	50	50	51
Malta	49 (0.3)	49	47	48	48	48	50	48	44	49	51	50	50	50	49	49	50	48	50	49	50	51	49	49	49	50	45	48	50	49	45
Norway	48 (0.7)	47	47	46	48	47	49	48	46	49	50	50	49	49	49	48	51	47	50	49	50	50	50	49	50	51	47	50	48	49	48
Croatia	48 (0.4)	47	49	46	50	49	48	49	54	48	50	48	48	47	48	47	52	47	50	48	52	49	51	48	53	53	52	50	47	48	52
Romania	47 (1.2)	47	48	46	48	48	48	48	50	47	49	48	48	48	47	48	49	47	48	48	49	49	48	48	49	50	48	49	47	47	48
New Zealand	46 (0.5)	45	44	43	45	45	47	46	40	46	48	47	47	48	46	45	48	45	47	47	48	48	47	47	47	48	44	47	47	46	44
Spain	45 (0.6)	44	46	42	46	46	46	45	43	45	47	46	46	45	45	45	48	44	46	46	47	46	46	46	48	48	44	47	45	45	45
Poland	45 (0.5)	45	46	43	46	46	46	46	47	45	48	46	46	46	45	45	49	44	47	46	48	47	48	46	49	49	47	48	45	45	47
Turkey	45 (0.8)	45	46	44	48	47	46	45	46	45	47	46	45	45	45	45	47	45	46	45	47	46	45	45	47	47	44	46	45	45	44
Azerbaijan	43 (1.2)	44	44	44	46	44	44	44	51	43	45	44	44	44	44	43	44	44	44	43	45	44	44	44	45	46	46	44	43	44	46
Chile	41 (0.5)	40	41	39	41	41	42	41	39	41	43	42	42	41	41	42	44	41	43	42	43	43	42	42	43	44	40	43	41	42	40
Thailand	41 (1.0)	41	42	41	44	42	41	41	42	40	42	42	41	41	41	41	42	41	42	41	41	41	41	41	43	43	40	42	41	41	40
Armenia	40 (0.8)	40	41	40	42	41	40	41	46	40	42	40	40	41	40	40	41	40	41	40	42	41	41	40	42	42	43	41	40	40	42
United Arab Emirates	37 (0.4)	37	37	35	38	37	38	37	35	37	38	38	38	37	37	37	38	37	38	37	38	38	37	37	38	38	35	38	37	37	36
Iran, Islamic Rep. of	37 (0.7)	36	37	37	39	36	37	36	37	36	37	37	37	36	37	37	38	37	38	36	38	37	37	37	37	38	36	37	36	37	37
Qatar	34 (0.6)	34	33	32	34	33	34	34	31	34	35	34	35	34	34	34	35	34	35	34	35	35	34	34	35	35	32	35	34	34	32
Oman	30 (0.4)	29	29	29	31	29	30	29	28	29	30	30	30	29	29	29	30	29	30	29	30	30	29	30	30	30	28	30	29	30	28
Tunisia	25 (0.5)	25	26	25	27	26	25	25	31	24	26	25	25	25	25	25	26	25	25	25	26	25	26	25	26	27	27	25	25	25	27
Morocco	24 (0.6)	23	23	22	24	23	23	23	24	23	24	24	24	23	24	23	25	23	24	23	23	23	24	24	23	24	23	23	23	23	24
Kuwait	23 (0.4)	23	22	22	24	22	23	23	21	23	24	23	24	23	23	23	23	23	24	23	24	23	23	23	23	23	21	23	23	23	21
Yemen	16 (0.4)	16	16	15	18	16	16	16	17	16	16	16	16	16	16	16	16	16	16	16	17	15	15	16	16	16	16	17	16	16	16
International Avg.	50 (0.1)	50	50	49	51	51	51	50	50	50	52	51	51	51	51	50	52	50	51	51	52	51	51	51	52	53	50	51	50	51	50
Botswana (6)	35 (0.7)	34	34	33	35	34	35	34	31	34	36	35	35	35	35	34	35	34	35	34	36	35	34	35	35	36	32	34	35	35	33
Yemen (6)	24 (0.6)	24	24	22	25	24	24	24	24	23	24	24	24	23	24	24	24	24	24	24	25	24	23	24	25	25	24	24	23	24	24
Benchmarking Participants																															
Quebec, Canada	58 (0.6)	57	58	56	58	58	58	58	55	58	60	59	58	58	58	57	60	57	59	58	60	59	59	58	60	61	56	60	58	58	57
Ontario, Canada	54 (0.8)	53	53	52	53	53	55	53	49	54	55	55	55	55	54	54	57	53	56	54	55	56	55	55	55	56	51	55	55	54	52
Alberta, Canada	51 (0.6)	50	50	49	50	50	51	50	46	51	53	52	51	52	51	51	53	50	52	51	53	53	52	51	53	53	48	52	51	51	49
Dubai, UAE	44 (0.4)	44	44	42	44	44	45	44	42	44	46	45	44	44	44	43	45	44	45	44	46	45	44	44	45	45	42	45	44	44	43
Abu Dhabi, UAE	34 (0.8)	34	33	32	35	33	34	34	31	34	35	34	34	34	34	34	35	34	35	34	35	35	34	34	35	35	32	34	34	34	32
Number of Items (Score Points) Identified*	184	158	138	134	111	127	170	163	65	178	160	169	179	158	170	154	146	171	164	169	145	162	146	176	132	138	119	156	158	181	120

* Of the 175 items in the Mathematics test, some extended-response items were scored on a two-point scale, resulting in 185 score points. Following item review, response categories for one of the items were combined, resulting in 184 score points.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Appendix F.1: Average Percent Correct for the Test-Curriculum Matching Analysis (Continued)

Read across the row to compare that country's performance based on the test items included by each of the countries across the top. Read down the column under a country name to compare the performance of the country down the left on the items included by the country listed on the top. Read along the diagonal to compare performance for each different country based on its own decisions about the test items to include.

Romania	New Zealand	Spain	Poland	Turkey	Azerbaijan	Chile	Thailand	Armenia	United Arab Emirates	Iran, Islamic Rep. of	Qatar	Oman	Tunisia	Morocco	Kuwait	Yemen	Botswana (6)	Yemen (6)
74	75	75	74	74	74	75	74	74	75	74	74	74	75	75	75	76	75	75
74	76	75	74	74	75	76	74	74	75	73	74	74	76	75	75	77	74	76
75	76	75	74	75	75	76	74	74	75	75	74	74	74	75	75	75	74	75
71	71	71	69	70	71	71	71	71	72	70	71	71	72	71	71	75	71	73
70	71	70	68	70	70	71	70	70	71	69	70	70	71	70	71	72	70	72
65	66	65	64	65	65	67	65	65	66	65	65	65	64	66	66	66	65	66
62	63	62	61	62	62	63	62	62	63	62	62	62	62	63	63	64	62	63
61	62	61	61	61	63	63	61	61	62	61	61	61	64	61	61	62	61	62
61	62	61	59	60	61	63	60	60	61	60	60	60	60	61	61	59	60	60
61	62	60	59	60	61	63	60	60	61	61	60	60	61	61	61	61	60	61
61	62	60	58	60	60	61	60	60	61	59	60	60	60	61	60	59	60	61
59	60	59	57	59	59	60	59	59	60	58	59	58	59	59	59	58	59	59
59	60	59	56	58	60	60	59	59	60	57	59	58	60	59	59	59	59	60
58	60	59	56	58	60	60	59	59	60	57	59	58	61	60	59	58	59	59
59	60	59	57	58	59	60	58	58	60	58	58	58	59	59	59	58	58	59
58	58	57	55	57	59	58	57	57	58	55	57	57	60	58	58	55	57	58
57	59	57	55	56	57	60	56	56	58	57	56	56	56	57	57	58	57	57
56	56	55	55	55	57	58	55	55	56	56	55	55	57	56	56	55	55	56
55	56	55	52	54	55	57	54	54	55	54	54	54	54	55	55	53	54	55
55	55	54	54	54	56	57	54	54	55	55	54	54	57	55	55	56	54	56
55	56	54	53	54	56	56	53	53	55	53	53	53	55	55	54	52	53	54
54	54	53	52	53	55	55	52	52	54	52	52	52	57	54	53	52	52	53
53	53	52	52	52	53	55	52	52	53	52	52	52	54	53	53	53	52	53
53	53	52	51	52	54	54	52	52	53	51	52	52	56	53	52	53	52	53
52	53	52	51	52	54	54	52	52	53	51	52	51	54	53	52	52	52	53
52	52	52	52	51	53	53	52	52	53	53	52	52	55	52	52	54	52	52
51	52	50	47	50	51	52	50	50	51	48	50	50	53	50	50	49	50	51
50	51	50	47	49	50	52	49	49	51	49	49	49	49	50	50	49	49	50
49	51	49	47	49	50	51	48	48	50	48	48	48	49	49	49	48	49	49
49	49	48	47	48	50	50	48	48	49	48	48	48	54	49	48	50	48	50
49	49	48	48	48	49	50	47	47	49	48	47	48	50	49	48	49	47	48
47	49	47	44	46	47	49	46	46	47	46	46	46	46	47	47	45	46	47
46	47	45	44	45	46	49	45	45	46	45	45	45	48	46	46	46	45	46
47	47	45	45	45	47	47	45	45	47	44	45	45	49	46	45	46	45	46
45	46	45	44	45	46	47	45	45	46	45	45	45	47	45	46	47	45	46
43	44	44	45	43	45	45	43	43	45	45	43	43	45	45	44	48	44	45
43	44	42	40	41	43	45	41	41	42	41	41	41	42	42	42	41	41	42
41	42	41	39	40	42	42	41	41	42	39	41	40	42	41	41	42	41	41
40	41	40	42	40	41	42	40	40	41	42	40	40	42	41	41	44	40	41
38	39	37	36	37	38	39	37	37	38	37	37	37	38	38	38	38	37	38
37	38	37	38	37	38	39	37	37	37	39	37	37	37	38	37	40	37	37
34	35	34	33	34	35	36	34	34	35	34	34	34	35	34	35	35	34	35
30	31	30	29	30	30	31	30	30	30	30	30	29	29	30	30	31	30	30
25	25	25	26	25	26	26	25	25	26	26	25	25	26	26	25	28	25	26
23	24	24	23	23	24	25	24	24	24	24	24	23	22	25	24	25	23	23
23	24	23	22	23	24	24	23	23	24	23	23	23	23	23	24	24	23	24
16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	19	16	17
51	52	51	50	50	51	52	50	50	51	50	50	50	52	51	51	51	50	51
35	36	35	33	35	35	36	35	35	36	35	35	34	35	35	35	35	35	35
24	24	24	23	23	24	24	24	24	24	23	24	24	25	24	24	26	24	25

Benchmarking Participants

Quebec, Canada	Ontario, Canada	Alberta, Canada	Dubai, UAE	Abu Dhabi, UAE	Average Percent Correct on All Items	Country
75	74	74	74	74	74 (0.7)	Singapore
76	75	73	74	75	74 (0.4)	Korea, Rep. of
75	75	74	74	75	74 (0.8)	Hong Kong SAR
71	71	70	71	71	71 (0.4)	Chinese Taipei
71	71	70	70	71	70 (0.4)	Japan
66	65	65	65	65	65 (0.6)	Northern Ireland
64	62	60	62	63	62 (0.5)	Belgium (Flemish)
63	61	60	61	62	61 (0.9)	Russian Federation
62	61	60	60	61	60 (0.8)	England
61	61	60	60	61	60 (0.5)	United States
62	60	59	60	61	60 (0.6)	Finland
60	59	58	59	59	59 (0.6)	Denmark
60	58	59	59	59	59 (0.4)	Netherlands
61	59	58	59	59	59 (0.8)	Portugal
60	58	58	58	59	58 (0.6)	Lithuania
59	57	56	57	58	57 (0.6)	Germany
58	57	57	56	57	56 (0.6)	Ireland
57	55	54	55	56	55 (0.7)	Hungary
56	55	54	54	55	54 (0.6)	Australia
56	54	54	54	55	54 (0.7)	Serbia
57	54	53	53	55	53 (0.5)	Slovenia
55	53	51	52	54	52 (0.6)	Czech Republic
54	52	51	52	53	52 (0.7)	Italy
54	52	51	52	53	52 (0.8)	Slovak Republic
53	52	51	52	52	52 (0.7)	Austria
53	51	51	52	52	52 (1.1)	Kazakhstan
52	51	50	50	51	50 (0.5)	Sweden
51	50	50	49	50	49 (0.3)	Malta
50	50	48	48	49	48 (0.7)	Norway
50	48	45	48	49	48 (0.4)	Croatia
49	48	47	47	48	47 (1.2)	Romania
47	47	46	46	47	46 (0.5)	New Zealand
47	46	44	45	46	45 (0.6)	Spain
48	45	44	45	47	45 (0.5)	Poland
46	45	45	45	46	45 (0.8)	Turkey
44	43	44	43	44	43 (1.2)	Azerbaijan
43	42	41	41	43	41 (0.5)	Chile
42	41	41	41	41	41 (1.0)	Thailand
41	40	39	40	41	40 (0.8)	Armenia
38	37	37	37	38	37 (0.4)	United Arab Emirates
38	37	36	37	37	37 (0.7)	Iran, Islamic Rep. of
35	34	34	34	35	34 (0.6)	Qatar
30	30	29	30	30	30 (0.4)	Oman
26	25	24	25	25	25 (0.5)	Tunisia
24	24	23	24	23	24 (0.6)	Morocco
24	23	23	23	24	23 (0.4)	Kuwait
16	16	16	16	16	16 (0.4)	Yemen
52	51	50	50	51	50 (0.1)	International Avg.
35	35	35	35	35	35 (0.7)	Botswana (6)
24	23	23	24	24	24 (0.6)	Yemen (6)

Benchmarking Participants

60	59	58	58	59	58 (0.6)	Quebec, Canada
56	56	55	54	55	54 (0.8)	Ontario, Canada
53	52	52	51	52	51 (0.6)	Alberta, Canada
45	44	44	44	45	44 (0.4)	Dubai, UAE
35	34	34	34	35	34 (0.8)	Abu Dhabi, UAE

165	159	182	127	179	168	135	184	184	159	139	184	178	117	150	169	109	182	162

152	153	138	184	158	184	Number of Items (Score Points) Identified*

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Appendix F.2: Average Percent Correct for the Test-Curriculum Matching Analysis

TIMSS 2011 Mathematics 8th Grade

Based on a subset of items specifically identified by each country as addressing its curriculum

Read across the row to compare that country's performance based on the test items included by each of the countries across the top. Read down the column under a country name to compare the performance of the country down the left on the items included by the country listed on the top. Read along the diagonal to compare performance for each different country based on its own decisions about the test items to include.

Country	Average Percent Correct on All Items	Korea, Rep. of	Singapore	Chinese Taipei	Hong Kong SAR	Japan	Russian Federation	Israel	Finland	Hungary	United States	England	Australia	Slovenia	Lithuania	Italy	New Zealand	Kazakhstan	Ukraine	Sweden	Norway	Armenia	Turkey	Romania	United Arab Emirates	Lebanon	Malaysia	Macedonia, Rep. of	Thailand	Qatar	Iran, Islamic Rep. of
Korea, Rep. of	74 (0.5)	75	74	74	74	75	76	74	75	74	74	74	74	75	74	76	74	74	75	74	74	74	74	75	74	74	75	74	74	74	74
Singapore	73 (0.9)	74	74	74	74	74	75	74	74	74	74	73	73	75	74	75	74	74	74	74	74	73	73	75	74	74	74	73	73	74	74
Chinese Taipei	72 (0.6)	73	72	73	72	72	73	72	72	72	72	72	72	73	72	73	72	72	72	72	72	72	72	73	72	73	71	72	72	72	72
Hong Kong SAR	68 (0.9)	69	68	69	68	69	70	68	69	68	68	68	68	70	68	70	69	68	69	68	69	68	68	69	69	69	70	68	68	68	69
Japan	64 (0.6)	65	64	64	65	66	66	64	65	64	64	64	65	65	64	66	65	64	65	65	65	64	64	65	64	64	66	64	64	64	64
Russian Federation	56 (0.9)	57	57	57	57	56	59	56	57	56	56	56	56	58	57	58	57	56	57	56	57	56	56	58	56	57	56	56	56	56	57
Israel	51 (1.0)	51	51	51	51	52	53	51	51	51	52	51	51	52	51	53	52	51	52	52	52	51	51	52	52	51	52	51	51	51	51
Finland	49 (0.7)	50	49	49	49	51	52	49	51	50	50	49	50	52	50	52	51	49	51	51	52	49	49	50	50	50	54	49	49	50	49
Hungary	49 (0.8)	49	49	49	48	49	52	48	49	49	49	49	49	51	49	51	50	48	50	49	50	49	49	50	49	49	52	49	49	49	49
United States	48 (0.7)	49	48	48	48	50	51	48	49	48	49	49	49	50	48	51	50	49	49	49	50	48	48	49	50	48	51	48	48	49	48
England	48 (1.4)	49	48	48	48	50	50	48	49	48	49	49	49	50	48	51	50	48	49	50	50	48	48	48	50	48	53	48	48	49	48
Australia	48 (1.3)	48	47	47	47	49	50	47	48	48	48	48	48	49	48	50	49	48	49	49	50	48	48	48	49	48	52	48	48	48	47
Slovenia	47 (0.5)	48	47	47	47	48	50	47	48	47	47	47	47	49	47	50	48	47	48	48	49	47	47	48	48	48	51	47	47	48	47
Lithuania	47 (0.6)	47	47	47	46	48	50	47	48	47	47	47	47	49	47	50	48	46	48	48	48	47	47	48	47	48	50	47	47	47	46
Italy	46 (0.6)	46	46	46	46	46	48	46	47	46	46	46	46	48	46	49	47	46	47	46	47	46	46	47	47	47	49	46	46	46	46
New Zealand	44 (1.4)	44	43	43	43	45	46	43	45	44	44	44	44	45	44	46	45	44	45	45	46	44	44	44	45	44	48	44	44	44	43
Kazakhstan	43 (1.0)	43	43	43	43	43	45	42	43	43	43	43	43	44	43	44	43	43	44	42	43	43	43	45	43	44	43	43	43	43	44
Ukraine	42 (0.9)	42	42	42	42	42	45	42	43	42	42	42	42	43	42	44	43	42	43	42	42	42	42	43	42	43	43	42	42	42	42
Sweden	41 (0.5)	42	41	41	41	43	44	42	42	41	42	42	42	43	42	44	43	41	42	44	43	41	41	42	43	42	46	41	41	42	41
Norway	39 (0.6)	40	39	38	38	41	41	39	40	39	40	39	40	41	39	42	41	39	40	41	41	39	39	39	40	39	46	39	39	40	38
Armenia	38 (0.6)	39	39	39	39	39	41	39	39	39	39	38	39	40	39	40	39	39	39	38	38	38	38	41	39	40	37	38	38	38	40
Turkey	38 (0.8)	38	38	37	37	38	39	38	38	38	38	38	38	39	38	40	39	38	38	38	39	38	38	38	38	38	40	38	38	38	38
Romania	38 (0.8)	38	38	38	38	38	40	38	38	38	38	38	38	39	38	39	39	38	39	38	38	38	38	39	38	39	38	38	38	38	38
United Arab Emirates	37 (0.5)	37	37	37	37	37	39	37	37	37	37	37	37	38	37	39	38	37	38	37	38	37	37	38	37	37	38	37	37	37	37
Lebanon	34 (0.8)	35	35	35	35	35	38	34	35	35	34	34	35	36	35	37	35	34	36	34	34	34	34	37	34	36	34	34	34	35	36
Malaysia	34 (1.0)	35	35	35	35	35	37	34	35	34	34	34	34	36	35	37	35	34	35	35	35	34	34	36	35	35	37	34	34	34	35
Macedonia, Rep. of	32 (0.9)	33	33	33	32	33	35	33	33	33	33	32	32	34	33	34	33	32	33	33	33	32	32	34	33	33	33	32	32	33	33
Thailand	31 (0.9)	31	31	31	31	31	33	31	32	31	31	31	31	33	31	33	32	31	32	31	32	31	31	32	31	31	33	31	31	31	31
Qatar	30 (0.5)	31	30	30	30	31	32	30	31	30	31	30	31	31	30	32	31	30	31	30	31	30	30	31	31	31	31	30	30	31	31
Iran, Islamic Rep. of	30 (0.8)	30	30	30	29	30	32	29	30	30	30	29	30	31	30	31	30	30	30	29	30	30	30	31	30	30	31	30	30	30	31
Tunisia	29 (0.6)	30	29	29	29	30	31	29	30	29	29	29	30	31	29	31	30	29	30	29	30	29	29	30	30	30	31	29	29	30	30
Palestinian Nat'l Auth.	29 (0.6)	29	29	29	29	29	31	29	29	29	29	29	29	30	29	30	29	29	29	28	29	29	29	30	29	29	30	29	29	29	30
Jordan	29 (0.5)	29	29	29	29	29	31	29	29	29	29	29	29	30	29	30	29	29	29	28	29	29	29	30	29	29	29	29	29	29	29
Chile	28 (0.4)	29	29	28	28	29	31	28	29	29	29	29	29	30	29	31	30	29	29	29	30	28	28	29	29	29	31	28	28	29	29
Oman	24 (0.3)	24	24	24	24	25	26	24	25	24	24	24	24	25	24	25	25	24	25	24	25	24	24	25	24	24	25	24	24	24	24
Morocco	22 (0.2)	23	22	23	23	23	25	22	23	22	22	22	22	23	22	24	23	22	23	22	23	22	22	24	22	23	24	22	22	22	23
International Avg.	43 (0.1)	44	43	43	43	44	45	43	44	43	43	43	43	45	43	45	44	43	44	44	44	43	43	44	44	44	45	43	43	43	43
Botswana (9)	25 (0.4)	26	25	25	25	26	27	25	26	25	25	25	25	26	25	27	26	25	26	25	26	25	25	26	26	25	27	25	25	26	26
South Africa (9)	20 (0.4)	20	20	20	20	21	22	20	21	20	21	20	20	21	20	22	21	20	21	21	21	20	20	21	21	21	22	20	20	20	21
Benchmarking Participants																															
Quebec, Canada	54 (0.7)	55	54	54	54	56	57	54	56	54	54	54	55	56	54	57	56	54	55	56	56	54	54	55	55	55	58	54	54	55	54
Ontario, Canada	49 (0.6)	49	49	49	48	50	51	49	50	49	49	49	50	51	49	52	51	49	50	50	51	49	49	48	51	49	54	49	49	50	49
Alberta, Canada	47 (0.7)	47	47	46	47	48	49	47	48	47	47	47	48	48	47	50	48	47	48	49	49	47	47	47	49	47	52	47	47	47	46
Dubai, UAE	42 (0.5)	42	42	42	42	42	44	42	42	42	42	42	42	43	42	44	43	42	43	42	43	42	42	43	43	43	43	42	42	42	42
Abu Dhabi, UAE	35 (0.8)	35	35	35	35	36	37	35	36	35	36	35	36	36	35	37	36	35	36	35	36	35	35	36	36	35	37	35	35	35	35
Number of Items (Score Points) Identified*	230	219	209	212	211	205	191	220	218	227	218	222	211	208	212	200	217	224	211	193	209	230	230	185	198	197	163	230	230	218	199

* Of the 217 items in the Mathematics test, some extended-response items were scored on a two-point scale, resulting in 232 score points. Following item review, response categories for two of the items were combined, resulting in 230 score points.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Appendix F.2: Average Percent Correct for the Test-Curriculum Matching Analysis (Continued)

Read across the row to compare that country's performance based on the test items included by each of the countries across the top. Read down the column under a country name to compare the performance of the country down the left on the items included by the country listed on the top. Read along the diagonal to compare performance for each different country based on its own decisions about the test items to include.

Tunisia	Palestinian Nat'l Auth.	Jordan	Chile	Oman	Morocco	Botswana (9)	South Africa (9)	Benchmarking Participants	Quebec, Canada	Ontario, Canada	Alberta, Canada	Dubai, UAE	Abu Dhabi, UAE	Average Percent Correct on All Items	Country
74	75	76	74	74	75	73	73		75	75	74	74	73	74 (0.5)	Korea, Rep. of
75	75	76	74	74	75	73	73		74	74	74	73	73	73 (0.9)	Singapore
73	73	74	72	72	73	72	72		72	72	72	72	72	72 (0.6)	Chinese Taipei
69	70	71	69	69	69	68	68		69	69	69	68	68	68 (0.9)	Hong Kong SAR
65	65	67	65	65	65	64	64		65	65	65	64	64	64 (0.6)	Japan
57	58	60	55	57	58	56	56		57	57	56	56	56	56 (0.9)	Russian Federation
52	53	55	52	52	52	50	51		51	52	52	51	51	51 (1.0)	Israel
50	51	53	53	50	51	48	49		51	52	51	49	49	49 (0.7)	Finland
50	50	52	51	49	50	48	48		49	50	50	49	49	49 (0.8)	Hungary
49	50	52	50	49	49	48	48		49	51	50	48	49	48 (0.7)	United States
49	50	51	52	49	49	47	48		49	51	50	48	48	48 (1.4)	England
49	49	51	51	49	48	46	47		49	51	49	48	48	48 (1.3)	Australia
48	49	51	50	48	48	46	47		48	50	48	47	47	47 (0.5)	Slovenia
48	49	50	48	48	48	46	46		47	48	48	47	47	47 (0.6)	Lithuania
47	48	50	48	47	47	45	46		46	48	47	46	46	46 (0.6)	Italy
45	45	47	47	45	44	43	44		45	47	45	44	44	44 (1.4)	New Zealand
43	44	46	41	43	44	42	42		43	43	43	43	43	43 (1.0)	Kazakhstan
42	43	46	41	43	43	41	42		42	43	42	42	42	42 (0.9)	Ukraine
42	44	45	46	42	43	41	41		42	44	43	41	41	41 (0.5)	Sweden
40	41	42	44	40	40	38	39		40	42	41	39	39	39 (0.6)	Norway
40	40	41	36	39	40	38	38		39	38	38	38	38	38 (0.6)	Armenia
38	39	41	39	39	38	37	38		38	39	39	38	38	38 (0.8)	Turkey
38	39	41	37	38	39	37	38		38	38	38	38	38	38 (0.8)	Romania
38	38	41	37	38	37	36	37		37	38	37	37	37	37 (0.5)	United Arab Emirates
35	36	38	33	35	36	34	34		35	34	34	34	34	34 (0.8)	Lebanon
35	36	38	36	35	36	34	34		35	36	35	34	34	34 (1.0)	Malaysia
33	34	36	32	33	33	32	32		33	33	33	32	33	32 (0.9)	Macedonia, Rep. of
31	32	35	32	32	32	30	31		32	33	32	31	31	31 (0.9)	Thailand
31	32	34	31	31	31	30	30		31	31	31	30	30	30 (0.5)	Qatar
30	31	33	30	30	30	29	29		30	31	30	30	30	30 (0.8)	Iran, Islamic Rep. of
30	30	33	30	30	30	29	29		30	31	30	29	29	29 (0.6)	Tunisia
29	30	33	29	29	29	28	29		29	30	29	29	29	29 (0.6)	Palestinian Nat'l Auth.
29	30	33	28	29	29	28	29		29	29	29	29	29	29 (0.5)	Jordan
29	30	32	31	29	29	28	28		29	30	29	28	29	28 (0.4)	Chile
24	25	27	24	25	24	24	24		24	25	24	24	24	24 (0.3)	Oman
23	23	25	23	23	23	22	22		23	23	22	22	22	22 (0.2)	Morocco
44	45	47	44	44	44	43	43		44	45	44	43	43	43 (0.1)	International Avg.
26	26	29	27	26	26	25	25		26	27	26	25	25	25 (0.4)	Botswana (9)
21	21	23	21	21	21	20	20		21	21	21	20	20	20 (0.4)	South Africa (9)
															Benchmarking Participants
56	56	57	57	55	56	53	54		56	57	56	54	54	54 (0.7)	Quebec, Canada
50	51	52	53	50	50	48	49		50	53	51	49	49	49 (0.6)	Ontario, Canada
48	48	50	51	48	48	46	47		48	50	49	47	47	47 (0.7)	Alberta, Canada
43	44	46	42	43	43	41	42		42	43	43	42	42	42 (0.5)	Dubai, UAE
36	37	39	36	36	36	35	35		35	37	36	35	35	35 (0.8)	Abu Dhabi, UAE
191	203	182	172	214	197	216	228		215	200	206	230	224	230	Number of Items (Score Points) Identified*

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

analyzed to determine whether the inclusion of these items had any effect on the international performance comparisons.[4]

The first column of data in Exhibits F.1 and F.2 show the average percent correct on all test items for each participant, together with its standard error. Subsequent columns show the performance of each participant on those items judged appropriate by the participant listed at the head of the column. Participants are presented in order of their performance based on average percent correct on all items, from highest to lowest. To interpret these exhibits, choosing a country and reading across its row provides the average percent correct for the students in that country on the items selected by each of the countries listed along the top of the exhibit. For example, at the fourth grade, Singapore, where the average percent correct was 75 percent on its own set of items, had 74 percent correct on the items selected by Korea and Hong Kong SAR, 75 percent on the items selected by Chinese Taipei, 74 percent on the items selected by Japan, and so forth. The column for a country listed at the top shows how each of the other participants performed on the set of items selected as appropriate for that country's students. Using the set of items selected by the England as an example, 75 percent of these items, on average, were answered correctly by students in Singapore, 74 percent by students in Korea and Hong Kong SAR, 71 percent by students in Chinese Taipei, 70 percent by students in Japan, 65 percent by those in Northern Ireland, and so forth. The shaded diagonal element in the exhibit shows how each country performed on the set of items that it selected based on its own curriculum. Thus, students from the England averaged 60 percent correct on the set of items identified by England for the analysis.

For each country's selected items, the international averages across participating countries are presented in the lower part of the exhibit. These show that the selections of items by the participating countries varied somewhat in average difficulty, ranging at the fourth grade from 49 percent correct, for those chosen by Hong Kong SAR, to 53 percent correct for those chosen by Austria. At the eighth grade, the average percent correct ranged from 43 percent, for many participants, to 47 percent for those chosen by Jordan.

Comparing the diagonal element for a country with the overall average percent correct shows the difference between performance on the set of items chosen as appropriate for that country and performance on the test as a whole. In general, countries performed better on their own item sets

4 It should be noted that the mathematics achievement presented in Exhibits F.1 and F.2 is based on average percent correct (the percentage of students in a country, averaged across all items), which is different from the average scale scores that are presented in Chapter 1.

than on the items overall, although not by much. To illustrate, the average percent correct for Singapore across all fourth grade mathematics items was 74 percent. The diagonal element shows that students from Singapore had a slightly greater average percent correct (75 percent) across the set of items selected as appropriate for Singapore than they did overall. Most participants had a difference of one or two percentage points between the two performance measures, with the largest differences in the Slovak Republic (5 percentage points). At the eighth grade, the differences were generally smaller; the largest being in Jordan and the province of Ontario (4 percentage points).

It is clear that the selection of items does not have a major effect on the relative performance among TIMSS participants. Participants that had relatively high or low performance across all the mathematics items also had relatively high or low performance on each of the various sets of items selected for the TCMA. For example, at the eighth grade, Korea had the highest average percent correct, not only on the test as a whole, but also on all of the different item selections (with some ties), with Singapore, Chinese Taipei, Hong Kong SAR and Japan next in order of performance on practically all selections of items. Although there are some changes in the ordering of countries based on the items selected for the TCMA, most of these differences are within the boundaries of sampling error.[5]

Even when countries performed better on the items judged by them to be included in their curriculum than they did overall, their performance relative to other participants was changed little. As an example, consider the 162 score points selected by the Slovenia at the fourth grade. The students in the Slovenia did better on these items (56% correct) than on the test as a whole (53% correct). However, most other countries also did better on these particular items, with an international average of 51 percent correct compared with 50 percent correct overall. The countries that performed better than the Slovenia on the overall test also performed as well or better on the items selected by the Slovenia.

The TCMA results provide evidence that the TIMSS 2011 mathematics assessment provides a reasonable basis for comparing achievement of the participating countries and benchmarking entities. This result is not unexpected; making the assessment as fair as possible was a major consideration in test development. The fact that the majority of countries indicated that most items were appropriate for their students means that the different average percent correct estimates were based on many of the same items. Insofar as countries

5 Small differences in performance between adjacent countries shown in this exhibit usually are not statistically significant. The standard errors for the average percent correct statistics based on the TIMSS 2011 sample are provided in Exhibits F.3 and F.4. For any sample average shown in Exhibits F.1 and F.2, it can be said with 95 percent confidence that the corresponding value in the population falls between the sample estimate plus or minus two standard errors.

Appendix F.3: Standard Errors for the Test-Curriculum Matching Analysis

Read across the row to compare that country's performance based on the test items included by each of the countries across the top. Read down the column under a country name to compare the performance of the country down the left on the items included by the country listed on the top. Read along the diagonal to compare performance for each different country based on its own decisions about the test items to include.

Country	Average Percent Correct on All Items	Singapore	Korea, Rep. of	Hong Kong SAR	Chinese Taipei	Japan	Northern Ireland	Belgium (Flemish)	Russian Federation	England	United States	Finland	Denmark	Netherlands	Portugal	Lithuania	Germany	Ireland	Hungary	Australia	Serbia	Slovenia	Czech Republic	Italy	Slovak Republic	Austria	Kazakhstan	Sweden	Malta	Norway	Croatia
Singapore	74 (0.7)	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Korea, Rep. of	74 (0.4)	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.4	0.4	0.4	0.4	0.3	0.4	0.3	0.4	0.4	0.4	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Hong Kong SAR	74 (0.8)	0.8	0.8	0.8	0.7	0.8	0.8	0.8	0.8	0.8	0.7	0.8	0.8	0.8	0.8	0.8	0.7	0.8	0.7	0.8	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Chinese Taipei	71 (0.4)	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Japan	70 (0.4)	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Northern Ireland	65 (0.6)	0.7	0.7	0.7	0.7	0.7	0.6	0.7	0.7	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.7	0.6	0.7
Belgium (Flemish)	62 (0.5)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Russian Federation	61 (0.9)	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.9	0.8	0.9	0.9	0.8	0.9	0.9	0.8	0.9	0.8	0.9	0.8	0.8	0.8	0.9	0.8	0.8	0.8	0.9	0.9	0.9	0.8
England	60 (0.8)	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.8	0.8	0.8	0.9
United States	60 (0.5)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.5	0.5	0.5	0.5	0.5	0.5
Finland	60 (0.6)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Denmark	59 (0.6)	0.7	0.6	0.7	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.6
Netherlands	59 (0.4)	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.5
Portugal	59 (0.8)	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Lithuania	58 (0.6)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Germany	57 (0.6)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Ireland	56 (0.6)	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Hungary	55 (0.7)	0.7	0.7	0.8	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.7	0.8	0.7	0.8	0.7	0.8	0.7	0.8	0.8	0.8	0.7	0.8	0.7	0.7	0.8	0.7	0.7	0.7
Australia	54 (0.6)	0.7	0.7	0.7	0.7	0.7	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Serbia	54 (0.7)	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Slovenia	53 (0.5)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Czech Republic	52 (0.6)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Italy	52 (0.7)	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.7	0.7	0.7	0.7	0.7	0.7
Slovak Republic	52 (0.8)	0.9	0.8	0.8	0.8	0.9	0.8	0.8	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Austria	52 (0.7)	0.7	0.7	0.7	0.8	0.7	0.7	0.7	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Kazakhstan	52 (1.1)	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Sweden	50 (0.5)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Malta	49 (0.3)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Norway	48 (0.7)	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.7	0.7	0.7	0.7	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Croatia	48 (0.4)	0.4	0.5	0.4	0.5	0.5	0.4	0.4	0.5	0.4	0.5	0.4	0.4	0.4	0.4	0.5	0.5	0.4	0.5	0.4	0.5	0.4	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.5
Romania	47 (1.2)	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
New Zealand	46 (0.5)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Spain	45 (0.6)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Poland	45 (0.5)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6
Turkey	45 (0.8)	0.9	0.8	0.9	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.8	0.8	0.9	0.8	0.9	0.8	0.9	0.8	0.9	0.9	0.9	0.8	0.8	0.9	0.8	0.8	0.9	0.8	0.9
Azerbaijan	43 (1.2)	1.3	1.2	1.2	1.2	1.3	1.2	1.2	1.2	1.2	1.2	1.3	1.2	1.3	1.3	1.2	1.2	1.2	1.2	1.3	1.2	1.2	1.2	1.3	1.2	1.2	1.2	1.3	1.2	1.2	1.2
Chile	41 (0.5)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Thailand	41 (1.0)	1.0	1.0	1.0	1.1	1.1	1.0	1.0	1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Armenia	40 (0.8)	0.8	0.7	0.8	0.7	0.7	0.8	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.7	0.8	0.7	0.8	0.7	0.8	0.8	0.8	0.8
United Arab Emirates	37 (0.4)	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Iran, Islamic Rep. of	37 (0.7)	0.7	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Qatar	34 (0.6)	0.6	0.6	0.6	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Oman	30 (0.4)	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Tunisia	25 (0.5)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.5
Morocco	24 (0.6)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Kuwait	23 (0.4)	0.4	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.4	0.4	0.4	0.4
Yemen	16 (0.4)	0.4	0.5	0.4	0.5	0.5	0.5	0.5	0.5	0.4	0.5	0.5	0.4	0.4	0.5	0.4	0.4	0.5	0.4	0.4	0.5	0.4	0.4	0.4	0.5	0.5	0.4	0.5	0.4	0.4	0.4
International Avg.	50 (0.1)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Botswana (6)	35 (0.7)	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.7	0.7
Yemen (6)	24 (0.6)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Benchmarking Participants																															
Quebec, Canada	58 (0.6)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.7
Ontario, Canada	54 (0.8)	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.8	0.7	0.8	0.8	0.8	0.7	0.8	0.7	0.7	0.8	0.8	0.8	0.8	0.7
Alberta, Canada	51 (0.6)	0.6	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6
Dubai, UAE	44 (0.4)	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Abu Dhabi, UAE	34 (0.8)	0.8	0.8	0.8	0.8	0.8	0.9	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.9	0.8	0.9	0.8	0.9	0.9	0.9	0.9	0.9	0.8	0.9	0.8	0.9	0.9	0.9
Number of Items (Score Points) Identified*	184	158	138	134	111	127	170	163	65	178	160	169	179	158	170	154	146	171	164	169	145	162	146	176	132	138	119	156	158	181	120

* Of the 175 items in the Mathematics test, some extended-response items were scored on a two-point scale, resulting in 185 score points. Following item review, response categories for one of the items were combined, resulting in 184 score points.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Appendix F.3: Standard Errors for the Test-Curriculum Matching Analysis (Continued)

Read across the row to compare that country's performance based on the test items included by each of the countries across the top. Read down the column under a country name to compare the performance of the country down the left on the items included by the country listed on the top. Read along the diagonal to compare performance for each different country based on its own decisions about the test items to include.

Romania	New Zealand	Spain	Poland	Turkey	Azerbaijan	Chile	Thailand	Armenia	United Arab Emirates	Iran, Islamic Rep. of	Qatar	Oman	Tunisia	Morocco	Kuwait	Yemen	Botswana (6)	Yemen (6)
0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
0.3	0.4	0.4	0.4	0.4	0.3	0.3	0.4	0.4	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.4	0.4	0.4	0.4	0.4
0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.7	0.6	0.6	0.7	0.6	0.6
0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
0.8	0.8	0.9	0.9	0.9	0.8	0.8	0.9	0.9	0.8	0.8	0.9	0.8	0.8	0.8	0.9	0.9	0.9	0.8
0.8	0.8	0.8	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.8	0.8
0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
0.7	0.6	0.6	0.7	0.6	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.6	0.6
0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.4
0.8	0.8	0.8	0.8	0.8	0.7	0.8	0.8	0.8	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
0.8	0.8	0.7	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.7	0.7	0.7	0.7	0.7
0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6
0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.7	0.7	0.7	0.7	0.7
0.8	0.8	0.8	0.9	0.8	0.8	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.7	0.8
1.1	1.1	1.1	1.0	1.1	1.1	1.1	1.1	1.1	1.1	1.0	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.7	0.7	0.7	0.7	0.7
0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.4	0.4	0.4	0.4
1.2	1.2	1.2	1.2	1.2	1.1	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.1	1.2	1.2
0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
0.6	0.6	0.6	0.7	0.6	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6
0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
0.9	0.9	0.8	0.9	0.8	0.9	0.9	0.8	0.8	0.9	0.9	0.8	0.8	0.9	0.9	0.9	0.9	0.8	0.8
1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.3	1.2	1.2	1.2	1.2	1.2	1.2	1.3	1.2	1.2
0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.1	1.0	1.0	1.0	1.1	1.0	1.0	1.0	1.0	1.0
0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.4
0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.5
0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
0.4	0.5	0.4	0.5	0.4	0.4	0.5	0.4	0.4	0.4	0.5	0.4	0.4	0.5	0.5	0.4	0.5	0.4	0.5
0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
0.7	0.8	0.7	0.7	0.7	0.7	0.8	0.7	0.7	0.7	0.8	0.7	0.7	0.7	0.7	0.7	0.8	0.7	0.7
0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.6	0.6

Benchmarking Participants

Quebec, Canada	Ontario, Canada	Alberta, Canada	Dubai, UAE	Abu Dhabi, UAE	Average Percent Correct on All Items	Country
0.7	0.7	0.7	0.7	0.7	74 (0.7)	Singapore
0.3	0.4	0.4	0.4	0.4	74 (0.4)	Korea, Rep. of
0.7	0.8	0.8	0.8	0.8	74 (0.8)	Hong Kong SAR
0.4	0.4	0.4	0.4	0.4	71 (0.4)	Chinese Taipei
0.4	0.4	0.4	0.4	0.4	70 (0.4)	Japan
0.6	0.6	0.7	0.6	0.7	65 (0.6)	Northern Ireland
0.5	0.5	0.5	0.5	0.5	62 (0.5)	Belgium (Flemish)
0.8	0.9	0.9	0.9	0.8	61 (0.9)	Russian Federation
0.8	0.8	0.8	0.8	0.8	60 (0.8)	England
0.5	0.5	0.5	0.5	0.5	60 (0.5)	United States
0.6	0.6	0.6	0.6	0.6	60 (0.6)	Finland
0.6	0.6	0.6	0.6	0.6	59 (0.6)	Denmark
0.4	0.4	0.4	0.4	0.4	59 (0.4)	Netherlands
0.8	0.8	0.8	0.8	0.8	59 (0.8)	Portugal
0.6	0.6	0.6	0.6	0.6	58 (0.6)	Lithuania
0.6	0.6	0.6	0.6	0.6	57 (0.6)	Germany
0.6	0.6	0.6	0.6	0.6	56 (0.6)	Ireland
0.8	0.8	0.7	0.7	0.8	55 (0.7)	Hungary
0.6	0.6	0.7	0.6	0.6	54 (0.6)	Australia
0.7	0.7	0.7	0.7	0.7	54 (0.7)	Serbia
0.5	0.5	0.5	0.5	0.5	53 (0.5)	Slovenia
0.6	0.6	0.6	0.6	0.6	52 (0.6)	Czech Republic
0.7	0.7	0.7	0.7	0.7	52 (0.7)	Italy
0.8	0.8	0.9	0.8	0.8	52 (0.8)	Slovak Republic
0.7	0.7	0.7	0.7	0.7	52 (0.7)	Austria
1.1	1.1	1.1	1.1	1.1	52 (1.1)	Kazakhstan
0.5	0.5	0.6	0.5	0.5	50 (0.5)	Sweden
0.3	0.3	0.3	0.3	0.3	49 (0.3)	Malta
0.7	0.7	0.7	0.7	0.7	48 (0.7)	Norway
0.5	0.4	0.4	0.4	0.4	48 (0.4)	Croatia
1.2	1.2	1.2	1.2	1.2	47 (1.2)	Romania
0.5	0.5	0.6	0.5	0.5	46 (0.5)	New Zealand
0.6	0.6	0.6	0.6	0.6	45 (0.6)	Spain
0.5	0.5	0.5	0.5	0.5	45 (0.5)	Poland
0.9	0.9	0.9	0.8	0.8	45 (0.8)	Turkey
1.2	1.3	1.2	1.2	1.2	43 (1.2)	Azerbaijan
0.5	0.5	0.5	0.5	0.5	41 (0.5)	Chile
1.0	1.0	1.0	1.0	1.0	41 (1.0)	Thailand
0.8	0.8	0.8	0.8	0.8	40 (0.8)	Armenia
0.4	0.4	0.4	0.4	0.4	37 (0.4)	United Arab Emirates
0.7	0.7	0.7	0.7	0.7	37 (0.7)	Iran, Islamic Rep. of
0.6	0.6	0.6	0.6	0.6	34 (0.6)	Qatar
0.4	0.4	0.4	0.4	0.4	30 (0.4)	Oman
0.5	0.5	0.5	0.5	0.5	25 (0.5)	Tunisia
0.6	0.6	0.6	0.6	0.6	24 (0.6)	Morocco
0.4	0.4	0.4	0.4	0.4	23 (0.4)	Kuwait
0.4	0.4	0.4	0.4	0.5	16 (0.4)	Yemen
0.1	0.1	0.1	0.1	0.1	50 (0.1)	International Avg.
0.8	0.7	0.7	0.7	0.7	35 (0.7)	Botswana (6)
0.6	0.6	0.6	0.6	0.6	24 (0.6)	Yemen (6)

Benchmarking Participants

0.6	0.6	0.7	0.6	0.6	58 (0.6)	Quebec, Canada
0.8	0.8	0.8	0.8	0.8	54 (0.8)	Ontario, Canada
0.6	0.6	0.7	0.6	0.7	51 (0.6)	Alberta, Canada
0.4	0.4	0.4	0.4	0.4	44 (0.4)	Dubai, UAE
0.9	0.9	0.8	0.8	0.9	34 (0.8)	Abu Dhabi, UAE

165	159	182	127	179	168	Number of Items (Score Points) Identified*
135	184	184	159	139	184	
178	117	150	169	109	182	
162	152	153	138	184	158	
					184	

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Appendix F.4: Standard Errors for the Test-Curriculum Matching Analysis

TIMSS 2011 Mathematics 8th Grade

Read across the row to compare that country's performance based on the test items included by each of the countries across the top. Read down the column under a country name to compare the performance of the country down the left on the items included by the country listed on the top. Read along the diagonal to compare performance for each different country based on its own decisions about the test items to include.

Country	Average Percent Correct on All Items	Korea, Rep. of	Singapore	Chinese Taipei	Hong Kong SAR	Japan	Russian Federation	Israel	Finland	Hungary	United States	England	Australia	Slovenia	Lithuania	Italy	New Zealand	Kazakhstan	Ukraine	Sweden	Norway	Armenia	Turkey	Romania	United Arab Emirates	Lebanon	Malaysia	Macedonia, Rep. of	Thailand	Qatar	Iran, Islamic Rep. of
Korea, Rep. of	74 (0.5)	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.5
Singapore	73 (0.9)	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Chinese Taipei	72 (0.6)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Hong Kong SAR	68 (0.9)	0.9	0.9	0.9	0.9	0.9	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.9	0.9	0.9	0.9	0.8	0.9	0.9	0.9	0.9	0.9	0.8	0.9	0.9	0.9	0.9
Japan	64 (0.6)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Russian Federation	56 (0.9)	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Israel	51 (1.0)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	1.0	1.0	1.0	1.0
Finland	49 (0.7)	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6
Hungary	49 (0.8)	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
United States	48 (0.7)	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
England	48 (1.4)	1.4	1.5	1.5	1.4	1.4	1.4	1.5	1.4	1.4	1.4	1.4	1.5	1.4	1.5	1.5	1.4	1.4	1.4	1.5	1.5	1.4	1.4	1.4	1.5	1.5	1.5	1.4	1.4	1.4	1.4
Australia	48 (1.3)	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.2	1.3	1.3	1.3	1.3
Slovenia	47 (0.5)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lithuania	47 (0.6)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Italy	46 (0.6)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
New Zealand	44 (1.4)	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
Kazakhstan	43 (1.0)	1.0	1.1	1.1	1.1	1.0	1.1	1.0	1.0	1.1	1.1	1.0	1.0	1.1	1.1	1.1	1.0	1.1	1.0	1.0	1.0	1.0	1.0	1.1	1.1	1.1	1.0	1.0	1.0	1.0	1.1
Ukraine	42 (0.9)	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Sweden	41 (0.5)	0.5	0.5	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.4
Norway	39 (0.6)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.6
Armenia	38 (0.6)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.6	0.6	0.6	0.5	0.6	0.6	0.6	0.6	0.6	0.6
Turkey	38 (0.8)	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Romania	38 (0.8)	0.8	0.9	0.9	0.9	0.8	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.8	0.9	0.8	0.8	0.8	0.8	0.9
United Arab Emirates	37 (0.5)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.5	0.5	0.5	0.5
Lebanon	34 (0.8)	0.8	0.9	0.9	0.8	0.8	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.8	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.8	0.8	0.8	0.8	0.8
Malaysia	34 (1.0)	1.0	1.1	1.1	1.1	1.0	1.1	1.0	1.1	1.0	1.0	1.0	1.0	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.0	1.0	1.1	1.1	1.1	1.1	1.0	1.0	1.1
Macedonia, Rep. of	32 (0.9)	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Thailand	31 (0.9)	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Qatar	30 (0.5)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Iran, Islamic Rep. of	30 (0.8)	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Tunisia	29 (0.6)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Palestinian Nat'l Auth.	29 (0.6)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Jordan	29 (0.5)	0.6	0.6	0.6	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.6	0.5	0.6	0.5	0.5	0.5	0.6	0.5
Chile	28 (0.4)	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.4	0.4	0.4	0.4
Oman	24 (0.3)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Morocco	22 (0.2)	0.2	0.3	0.3	0.3	0.3	0.3	0.2	0.3	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.3	0.2	0.3	0.2	0.2	0.2	0.2	0.2
International Avg.	43 (0.1)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Botswana (9)	25 (0.4)	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
South Africa (9)	20 (0.4)	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.4	0.4	0.4	0.4	0.4	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Benchmarking Participants																															
Quebec, Canada	54 (0.7)	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Ontario, Canada	49 (0.6)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.6
Alberta, Canada	47 (0.7)	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Dubai, UAE	42 (0.5)	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Abu Dhabi, UAE	35 (0.8)	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Number of Items (Score Points) Identified*	230	219	209	212	211	205	191	220	218	227	218	222	211	208	212	200	217	224	211	193	209	230	230	185	198	197	163	230	230	218	199

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

* Of the 217 items in the Mathematics test, some extended-response items were scored on a two-point scale, resulting in 232 score points. Following item review, response categories for two of the items were combined, resulting in 230 score points.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

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Appendix F.4: Standard Errors for the Test-Curriculum Matching Analysis (Continued)

Read across the row to compare that country's performance based on the test items included by each of the countries across the top. Read down the column under a country name to compare the performance of the country down the left on the items included by the country listed on the top. Read along the diagonal to compare performance for each different country based on its own decisions about the test items to include.

Tunisia	Palestinian Nat'l Auth.	Jordan	Chile	Oman	Morocco	Botswana (9)	South Africa (9)	Benchmarking Participants	Quebec, Canada	Ontario, Canada	Alberta, Canada	Dubai, UAE	Abu Dhabi, UAE	Average Percent Correct on All Items	Country
0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		0.5	0.5	0.5	0.5	0.5	74 (0.5)	Korea, Rep. of
0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9		0.9	0.9	0.9	0.9	0.9	73 (0.9)	Singapore
0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6		0.6	0.6	0.6	0.6	0.6	72 (0.6)	Chinese Taipei
0.9	0.9	0.8	0.8	0.9	0.9	0.9	0.9		0.9	0.8	0.8	0.9	0.9	68 (0.9)	Hong Kong SAR
0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6		0.6	0.6	0.6	0.6	0.6	64 (0.6)	Japan
0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9		0.9	0.9	0.9	0.9	0.9	56 (0.9)	Russian Federation
1.0	1.0	1.0	0.9	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	51 (1.0)	Israel
0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7		0.7	0.7	0.7	0.7	0.7	49 (0.7)	Finland
0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8		0.8	0.8	0.8	0.8	0.8	49 (0.8)	Hungary
0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7		0.7	0.7	0.7	0.7	0.7	48 (0.7)	United States
1.4	1.4	1.4	1.5	1.5	1.5	1.5	1.4		1.4	1.5	1.5	1.4	1.4	48 (1.4)	England
1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3		1.3	1.3	1.3	1.3	1.3	48 (1.3)	Australia
0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.5		0.5	0.5	0.5	0.5	0.5	47 (0.5)	Slovenia
0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6		0.6	0.6	0.6	0.6	0.6	47 (0.6)	Lithuania
0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6		0.6	0.6	0.6	0.6	0.6	46 (0.6)	Italy
1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4		1.4	1.4	1.4	1.4	1.4	44 (1.4)	New Zealand
1.1	1.0	1.0	1.0	1.1	1.1	1.1	1.0		1.0	1.0	1.0	1.0	1.0	43 (1.0)	Kazakhstan
0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9		0.9	0.9	0.9	0.9	0.9	42 (0.9)	Ukraine
0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		0.5	0.5	0.5	0.5	0.5	41 (0.5)	Sweden
0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.6		0.6	0.6	0.6	0.6	0.6	39 (0.6)	Norway
0.6	0.6	0.6	0.5	0.6	0.6	0.6	0.6		0.6	0.5	0.6	0.6	0.6	38 (0.6)	Armenia
0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8		0.8	0.8	0.8	0.8	0.8	38 (0.8)	Turkey
0.9	0.9	0.8	0.8	0.8	0.9	0.9	0.8		0.8	0.8	0.8	0.8	0.8	38 (0.8)	Romania
0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		0.5	0.5	0.5	0.5	0.5	37 (0.5)	United Arab Emirates
0.9	0.9	0.8	0.8	0.8	0.9	0.8	0.8		0.8	0.8	0.8	0.8	0.8	34 (0.8)	Lebanon
1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.0		1.1	1.1	1.1	1.0	1.0	34 (1.0)	Malaysia
0.9	1.0	1.0	0.9	0.9	0.9	0.9	0.9		0.9	0.9	0.9	0.9	0.9	32 (0.9)	Macedonia, Rep. of
0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9		0.9	0.9	0.9	0.9	0.9	31 (0.9)	Thailand
0.5	0.6	0.5	0.5	0.5	0.6	0.5	0.5		0.5	0.5	0.5	0.5	0.5	30 (0.5)	Qatar
0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8		0.8	0.8	0.8	0.8	0.8	30 (0.8)	Iran, Islamic Rep. of
0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6		0.6	0.6	0.6	0.6	0.6	29 (0.6)	Tunisia
0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6		0.6	0.6	0.6	0.6	0.6	29 (0.6)	Palestinian Nat'l Auth.
0.5	0.6	0.6	0.5	0.6	0.6	0.6	0.5		0.5	0.5	0.6	0.5	0.5	29 (0.5)	Jordan
0.4	0.5	0.4	0.5	0.4	0.5	0.4	0.4		0.4	0.4	0.4	0.4	0.4	28 (0.4)	Chile
0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3		0.3	0.3	0.3	0.3	0.3	24 (0.3)	Oman
0.2	0.3	0.3	0.2	0.3	0.3	0.3	0.2		0.2	0.2	0.2	0.2	0.2	22 (0.2)	Morocco
0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		0.1	0.1	0.1	0.1	0.1	43 (0.1)	International Avg.
0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4		0.4	0.4	0.4	0.4	0.4	25 (0.4)	Botswana (9)
0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4		0.4	0.4	0.4	0.4	0.4	20 (0.4)	South Africa (9)
Benchmarking Participants															
0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7		0.7	0.7	0.7	0.7	0.7	54 (0.7)	Quebec, Canada
0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6		0.6	0.7	0.6	0.6	0.6	49 (0.6)	Ontario, Canada
0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7		0.7	0.7	0.7	0.7	0.7	47 (0.7)	Alberta, Canada
0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		0.5	0.5	0.5	0.5	0.5	42 (0.5)	Dubai, UAE
0.9	0.9	0.8	0.9	0.8	0.8	0.8	0.8		0.8	0.8	0.8	0.8	0.8	35 (0.8)	Abu Dhabi, UAE
191	203	182	172	214	197	216	228		215	200	206	230	224	230	Number of Items (Score Points) Identified*

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

rejected items that would be difficult for their students, these items tended to be difficult for students in other countries as well. The analysis shows that omitting such items tends to improve the results for that country, but also tends to improve the results for all other countries, so that the overall pattern of relative performance is largely unaffected.

Appendix G

Percentiles and Standard Deviations of Mathematics Achievement

Appendix G.1: Percentiles of Mathematics Achievement

TIMSS 2011 Mathematics 4th Grade

Country	5th Percentile	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile	95th Percentile
Armenia	305 (6.0)	336 (3.8)	390 (5.4)	454 (5.3)	516 (4.0)	567 (5.7)	595 (2.3)
Australia	366 (6.2)	402 (5.4)	462 (3.1)	520 (3.2)	574 (4.0)	624 (5.6)	652 (6.0)
Austria	401 (4.3)	426 (5.3)	466 (3.7)	511 (3.2)	552 (2.9)	587 (2.9)	606 (4.4)
Azerbaijan	294 (9.1)	328 (6.0)	391 (6.8)	465 (4.9)	535 (6.3)	594 (9.6)	625 (7.0)
Bahrain	282 (7.1)	319 (6.0)	377 (4.3)	439 (3.1)	498 (4.3)	549 (5.1)	577 (4.0)
Belgium (Flemish)	450 (4.5)	472 (2.0)	509 (3.2)	550 (2.1)	590 (2.9)	625 (3.1)	645 (5.1)
Chile	326 (5.1)	355 (3.9)	407 (4.0)	463 (2.2)	518 (2.6)	565 (3.1)	592 (3.7)
Chinese Taipei	459 (6.4)	495 (2.8)	546 (3.6)	596 (1.5)	642 (2.3)	681 (3.0)	704 (2.5)
Croatia	376 (5.6)	402 (4.0)	446 (2.8)	493 (2.6)	537 (1.9)	573 (2.2)	595 (1.9)
Czech Republic	387 (6.0)	419 (5.0)	467 (2.8)	514 (2.4)	560 (2.3)	598 (2.3)	621 (3.7)
Denmark	413 (5.3)	445 (6.1)	493 (2.8)	541 (1.7)	585 (3.0)	624 (3.7)	646 (4.5)
England	385 (5.9)	423 (5.1)	483 (6.4)	549 (3.5)	605 (2.5)	652 (5.2)	677 (5.7)
Finland	430 (7.5)	456 (4.4)	501 (3.0)	549 (2.4)	592 (2.7)	631 (3.0)	654 (3.2)
Georgia	293 (8.4)	331 (5.8)	392 (6.0)	456 (3.8)	512 (2.7)	559 (4.6)	589 (6.0)
Germany	420 (7.8)	446 (4.6)	488 (2.9)	530 (3.2)	570 (2.3)	606 (3.4)	626 (2.1)
Hong Kong SAR	488 (11.0)	519 (5.7)	563 (3.3)	606 (3.3)	645 (3.4)	681 (3.6)	702 (2.7)
Hungary	352 (8.3)	397 (6.3)	462 (3.8)	523 (4.3)	577 (2.8)	623 (4.0)	650 (2.8)
Iran, Islamic Rep. of	271 (6.4)	306 (7.2)	370 (3.3)	435 (2.8)	496 (3.9)	547 (4.6)	575 (2.9)
Ireland	390 (4.1)	425 (4.7)	479 (3.0)	533 (3.9)	580 (2.9)	622 (4.7)	648 (4.7)
Italy	386 (6.2)	414 (4.0)	461 (4.6)	510 (3.6)	557 (3.3)	598 (1.9)	622 (3.6)
Japan	460 (6.9)	492 (3.7)	540 (2.1)	588 (1.7)	635 (2.4)	675 (1.8)	700 (4.7)
Kazakhstan	363 (7.7)	390 (5.3)	442 (6.6)	502 (6.3)	560 (6.5)	608 (7.8)	637 (7.9)
Korea, Rep. of	489 (4.6)	517 (3.2)	561 (2.4)	607 (2.3)	651 (2.1)	691 (3.2)	714 (3.9)
Kuwait	170 (6.9)	207 (4.5)	271 (4.4)	346 (4.2)	415 (3.1)	470 (4.3)	500 (5.0)
Lithuania	405 (4.5)	436 (3.6)	486 (2.9)	537 (3.8)	585 (2.7)	626 (3.3)	650 (2.1)
Malta	357 (4.7)	391 (2.6)	446 (2.9)	502 (1.9)	549 (2.2)	590 (3.3)	613 (2.6)
Morocco	177 (3.1)	206 (3.0)	261 (4.3)	329 (4.5)	404 (6.2)	472 (7.5)	511 (8.2)
Netherlands	449 (3.2)	470 (2.3)	505 (2.6)	543 (2.5)	577 (1.9)	605 (2.8)	623 (2.7)
New Zealand	339 (6.7)	374 (5.8)	432 (2.3)	492 (2.4)	545 (2.7)	589 (2.4)	614 (3.5)
Northern Ireland	411 (9.8)	451 (5.1)	511 (3.8)	567 (3.4)	622 (3.0)	668 (5.5)	693 (4.1)
Norway	376 (5.9)	406 (5.0)	451 (4.0)	497 (2.5)	542 (5.5)	581 (5.3)	604 (6.5)
Oman	208 (5.3)	245 (4.3)	314 (4.2)	390 (4.1)	459 (2.8)	515 (2.5)	548 (3.2)
Poland	352 (3.8)	384 (3.5)	435 (2.7)	485 (1.7)	531 (1.8)	570 (3.0)	595 (3.8)
Portugal	417 (4.6)	445 (5.3)	488 (3.9)	534 (3.5)	578 (4.2)	619 (4.9)	642 (6.7)
Qatar	237 (5.9)	274 (5.9)	338 (4.2)	416 (5.3)	487 (6.3)	547 (3.8)	582 (6.5)
Romania	287 (13.5)	336 (13.4)	416 (8.5)	494 (6.1)	557 (6.0)	607 (6.8)	636 (5.7)
Russian Federation	417 (6.7)	447 (6.1)	493 (4.0)	544 (3.4)	593 (4.5)	635 (4.3)	660 (6.5)
Saudi Arabia	245 (8.7)	282 (6.6)	346 (5.2)	412 (5.8)	473 (5.9)	532 (7.5)	568 (8.0)
Serbia	362 (9.8)	401 (5.7)	461 (2.9)	520 (5.5)	574 (2.2)	622 (3.0)	652 (3.9)
Singapore	464 (7.4)	502 (4.6)	559 (5.3)	612 (3.3)	661 (4.2)	701 (3.0)	723 (3.2)
Slovak Republic	365 (8.4)	402 (5.5)	460 (3.6)	513 (3.0)	561 (2.2)	600 (4.0)	626 (5.2)
Slovenia	395 (4.4)	423 (2.9)	468 (2.3)	517 (1.7)	561 (3.6)	597 (2.6)	619 (3.3)
Spain	362 (10.3)	388 (3.8)	435 (5.8)	486 (2.8)	532 (2.1)	572 (2.2)	593 (3.6)
Sweden	388 (6.9)	416 (3.6)	462 (2.8)	507 (2.6)	549 (2.4)	587 (3.1)	610 (4.8)
Thailand	318 (7.5)	352 (9.7)	406 (5.5)	462 (4.8)	514 (5.4)	557 (5.3)	580 (6.2)
Tunisia	198 (3.3)	234 (5.1)	294 (3.7)	362 (5.8)	427 (4.8)	480 (4.2)	510 (4.4)
Turkey	289 (13.3)	338 (7.4)	408 (6.1)	477 (4.1)	540 (3.6)	591 (4.1)	618 (4.0)
United Arab Emirates	270 (2.7)	304 (3.3)	366 (2.8)	437 (3.0)	504 (2.5)	560 (2.1)	593 (3.2)
United States	410 (3.3)	440 (3.6)	492 (2.2)	544 (2.9)	593 (2.3)	635 (2.7)	660 (1.5)
Yemen	74 (6.0)	108 (8.7)	170 (6.7)	243 (5.8)	322 (6.5)	395 (5.6)	438 (9.5)

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Note: Percentiles are defined in terms of percentages of students at or below a point on the scale.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Appendix G.1: Percentiles of Mathematics Achievement (Continued)

Country	5th Percentile	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile	95th Percentile
Sixth Grade Participants							
Botswana	268 (3.6)	298 (7.0)	355 (5.5)	424 (4.7)	485 (5.0)	533 (5.4)	559 (9.8)
Honduras	257 (7.4)	288 (7.9)	339 (8.1)	398 (5.7)	454 (4.3)	502 (6.8)	531 (9.1)
Yemen	184 (11.8)	219 (9.1)	282 (5.5)	352 (6.5)	418 (7.2)	472 (3.7)	501 (5.3)
Benchmarking Participants							
Alberta, Canada	397 (8.6)	423 (5.0)	464 (3.2)	509 (3.1)	551 (3.4)	587 (2.7)	609 (3.7)
Ontario, Canada	393 (4.3)	422 (5.8)	470 (4.1)	521 (2.9)	568 (5.8)	609 (5.9)	634 (6.1)
Quebec, Canada	432 (4.1)	454 (3.6)	492 (2.9)	534 (2.4)	574 (2.8)	610 (3.5)	631 (4.5)
Abu Dhabi, UAE	256 (5.5)	289 (6.1)	348 (5.3)	420 (5.4)	486 (6.1)	541 (8.9)	572 (5.5)
Dubai, UAE	292 (3.5)	330 (3.6)	400 (3.8)	474 (2.2)	541 (2.6)	592 (1.9)	623 (4.4)
Florida, US	422 (2.7)	448 (4.7)	495 (3.6)	545 (2.9)	596 (4.9)	641 (4.1)	666 (3.3)
North Carolina, US	432 (8.2)	460 (6.1)	507 (5.8)	556 (3.2)	603 (3.2)	644 (5.6)	668 (6.7)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Appendix G.2: Percentiles of Mathematics Achievement

Country	5th Percentile	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile	95th Percentile
Armenia	310 (6.1)	344 (4.6)	405 (4.6)	473 (3.3)	531 (2.6)	578 (3.9)	608 (3.7)
Australia	369 (4.8)	397 (3.3)	445 (5.1)	503 (6.1)	560 (7.0)	618 (7.8)	652 (12.0)
Bahrain	246 (5.9)	279 (5.7)	339 (3.3)	409 (2.1)	479 (2.0)	539 (3.6)	570 (4.0)
Chile	290 (8.1)	315 (3.6)	361 (3.1)	414 (4.0)	469 (4.1)	522 (4.2)	553 (4.3)
Chinese Taipei	413 (7.0)	459 (7.0)	543 (5.2)	623 (3.1)	683 (3.5)	734 (4.9)	765 (9.6)
England	361 (8.3)	393 (7.0)	448 (8.3)	510 (6.3)	567 (7.4)	616 (6.6)	640 (7.1)
Finland	405 (7.2)	430 (3.7)	470 (5.3)	516 (3.0)	559 (2.0)	596 (3.2)	617 (2.1)
Georgia	254 (6.0)	289 (3.4)	356 (5.1)	435 (5.7)	507 (4.2)	563 (5.2)	598 (7.5)
Ghana	194 (5.4)	222 (3.9)	271 (5.0)	328 (4.6)	389 (4.7)	442 (5.8)	474 (6.7)
Hong Kong SAR	428 (13.6)	470 (10.9)	537 (6.2)	595 (4.3)	644 (5.5)	684 (3.6)	706 (5.8)
Hungary	348 (7.1)	385 (5.1)	448 (3.7)	512 (3.1)	567 (4.1)	614 (3.9)	642 (5.2)
Indonesia	248 (9.7)	280 (6.0)	330 (5.3)	386 (4.9)	442 (4.4)	494 (6.8)	524 (4.2)
Iran, Islamic Rep. of	266 (5.5)	296 (4.6)	348 (4.5)	412 (4.8)	476 (5.5)	537 (7.1)	578 (11.3)
Israel	338 (9.9)	381 (6.6)	452 (6.8)	525 (5.6)	585 (4.0)	636 (6.5)	663 (4.6)
Italy	372 (6.1)	400 (6.4)	450 (2.9)	502 (3.9)	549 (2.3)	590 (4.2)	615 (3.1)
Japan	425 (3.9)	458 (2.7)	515 (3.3)	574 (1.8)	630 (2.2)	674 (3.4)	701 (5.6)
Jordan	232 (8.4)	271 (8.0)	340 (6.4)	413 (4.8)	479 (2.6)	528 (2.8)	556 (3.7)
Kazakhstan	353 (4.3)	381 (4.9)	431 (5.0)	490 (5.8)	544 (5.4)	587 (5.3)	611 (7.5)
Korea, Rep. of	455 (4.1)	492 (3.0)	555 (3.1)	619 (2.8)	676 (3.6)	724 (5.5)	750 (3.7)
Lebanon	327 (6.0)	352 (3.8)	396 (4.4)	448 (4.1)	502 (3.3)	546 (7.4)	573 (5.2)
Lithuania	369 (4.5)	401 (4.4)	450 (3.1)	505 (3.0)	558 (3.3)	602 (3.3)	625 (4.6)
Macedonia, Rep. of	239 (11.1)	279 (9.6)	352 (5.3)	432 (5.5)	504 (6.6)	561 (5.5)	596 (7.6)
Malaysia	290 (7.1)	319 (4.8)	373 (6.0)	440 (8.2)	507 (6.9)	560 (6.0)	589 (7.1)
Morocco	236 (3.0)	264 (3.0)	312 (2.8)	367 (2.2)	428 (3.1)	484 (3.5)	520 (4.0)
New Zealand	346 (7.8)	375 (5.1)	428 (5.9)	489 (6.8)	548 (7.2)	598 (5.4)	624 (6.3)
Norway	366 (4.2)	390 (4.1)	431 (3.2)	477 (2.8)	520 (2.9)	556 (2.8)	577 (3.2)
Oman	186 (4.8)	224 (4.8)	290 (3.8)	368 (3.1)	444 (3.0)	505 (2.4)	541 (2.6)
Palestinian Nat'l Auth.	236 (5.8)	272 (3.5)	336 (5.5)	406 (3.3)	476 (4.9)	533 (4.6)	562 (4.3)
Qatar	227 (7.9)	265 (6.0)	331 (5.7)	412 (5.7)	489 (2.9)	552 (5.6)	586 (10.8)
Romania	291 (6.1)	327 (5.3)	386 (6.3)	458 (3.7)	529 (4.7)	592 (6.7)	626 (6.3)
Russian Federation	399 (5.5)	431 (6.4)	485 (3.6)	543 (5.3)	596 (3.7)	641 (5.6)	666 (4.2)
Saudi Arabia	243 (6.8)	274 (5.3)	329 (5.0)	392 (4.5)	458 (5.7)	516 (5.1)	551 (10.6)
Singapore	453 (9.4)	494 (10.2)	559 (6.6)	620 (4.5)	672 (2.7)	713 (3.1)	734 (3.6)
Slovenia	387 (4.3)	412 (3.5)	457 (3.3)	506 (2.1)	554 (3.0)	595 (3.1)	619 (3.3)
Sweden	368 (3.0)	395 (2.5)	440 (3.2)	487 (2.0)	532 (2.4)	569 (2.2)	590 (2.9)
Syrian Arab Republic	217 (8.9)	253 (8.6)	313 (5.9)	381 (4.5)	451 (4.7)	505 (6.3)	535 (6.0)
Thailand	290 (6.7)	318 (3.5)	368 (4.0)	425 (5.3)	483 (4.7)	536 (8.7)	573 (10.9)
Tunisia	305 (3.6)	330 (2.9)	373 (2.9)	421 (4.5)	475 (3.3)	525 (5.1)	554 (6.2)
Turkey	273 (5.0)	311 (5.5)	374 (2.4)	447 (5.3)	529 (6.9)	603 (5.4)	645 (10.0)
Ukraine	326 (5.2)	362 (7.0)	421 (5.5)	482 (3.8)	542 (4.5)	592 (5.9)	621 (4.6)
United Arab Emirates	309 (2.6)	340 (3.1)	394 (2.1)	457 (2.7)	518 (2.5)	568 (3.7)	598 (3.3)
United States	381 (4.3)	409 (4.1)	457 (3.7)	511 (3.4)	562 (3.1)	607 (4.9)	635 (5.9)
Ninth Grade Participants							
Botswana	265 (3.9)	295 (4.1)	345 (2.6)	400 (2.9)	449 (2.5)	494 (3.7)	521 (4.0)
Honduras	215 (4.5)	241 (5.6)	285 (5.0)	336 (3.7)	390 (4.4)	437 (7.8)	467 (10.2)
South Africa	229 (4.2)	252 (3.2)	293 (2.5)	343 (3.1)	398 (2.9)	463 (5.7)	516 (8.2)
Benchmarking Participants							
Alberta, Canada	400 (2.1)	423 (3.7)	463 (3.2)	506 (2.2)	549 (2.9)	584 (3.0)	606 (3.5)
Ontario, Canada	391 (4.7)	419 (2.6)	465 (3.2)	514 (2.3)	561 (2.9)	599 (3.6)	621 (4.0)
Quebec, Canada	425 (3.1)	449 (3.8)	491 (2.5)	534 (2.1)	575 (2.6)	609 (3.6)	628 (2.5)
Abu Dhabi, UAE	306 (4.9)	336 (6.2)	388 (4.6)	449 (3.8)	510 (5.4)	560 (5.6)	589 (6.8)
Dubai, UAE	317 (5.5)	352 (2.7)	415 (4.0)	481 (2.2)	544 (3.5)	594 (5.4)	624 (4.8)
Alabama, US	335 (4.7)	362 (6.6)	410 (9.8)	466 (7.9)	521 (8.6)	568 (11.9)	596 (10.2)
California, US	357 (9.3)	389 (5.5)	439 (6.1)	494 (5.9)	548 (6.6)	595 (8.8)	624 (6.3)
Colorado, US	391 (5.7)	415 (6.4)	464 (6.7)	521 (6.6)	572 (5.8)	615 (4.6)	639 (4.0)
Connecticut, US	374 (10.8)	404 (6.5)	459 (6.4)	521 (6.0)	579 (5.2)	626 (5.0)	650 (7.1)
Florida, US	393 (8.1)	418 (6.1)	460 (5.4)	511 (7.1)	564 (9.0)	614 (9.0)	645 (14.9)
Indiana, US	400 (7.6)	427 (4.7)	473 (5.8)	524 (5.9)	570 (7.1)	612 (7.0)	635 (5.9)
Massachusetts, US	435 (7.8)	466 (8.4)	513 (4.4)	563 (5.5)	611 (8.0)	653 (5.2)	677 (8.6)
Minnesota, US	419 (7.3)	448 (6.6)	497 (6.4)	548 (5.4)	595 (5.3)	635 (5.5)	658 (7.0)
North Carolina, US	403 (7.3)	434 (8.1)	483 (7.6)	537 (7.8)	591 (8.5)	639 (7.5)	667 (11.3)

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
Note: Percentiles are defined in terms of percentages of students at or below a point on the scale.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Appendix G.3: Standard Deviations of Mathematics Achievement

Country	Overall		Girls		Boys	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Armenia	452 (3.5)	89 (1.5)	454 (4.1)	87 (2.0)	451 (3.6)	90 (1.7)
Australia	516 (2.9)	86 (2.0)	513 (3.3)	83 (2.2)	519 (3.6)	89 (2.5)
Austria	508 (2.6)	63 (1.1)	504 (2.7)	61 (1.4)	513 (3.3)	63 (1.3)
Azerbaijan	463 (5.8)	101 (2.6)	466 (6.4)	101 (3.1)	460 (5.9)	101 (2.6)
Bahrain	436 (3.3)	90 (1.9)	440 (4.5)	81 (2.2)	432 (4.0)	98 (2.7)
Belgium (Flemish)	549 (1.9)	60 (1.0)	545 (2.2)	59 (1.3)	553 (2.4)	60 (1.2)
Chile	462 (2.3)	81 (1.5)	457 (2.7)	77 (1.7)	466 (2.8)	83 (1.9)
Chinese Taipei	591 (2.0)	73 (0.9)	592 (2.5)	72 (1.7)	590 (2.4)	74 (1.5)
Croatia	490 (1.9)	67 (1.5)	485 (2.4)	65 (1.8)	495 (2.4)	69 (1.8)
Czech Republic	511 (2.4)	70 (1.7)	505 (2.8)	69 (2.0)	516 (2.7)	71 (1.9)
Denmark	537 (2.6)	71 (2.0)	534 (2.9)	70 (2.6)	540 (2.9)	71 (2.0)
England	542 (3.5)	89 (1.7)	541 (4.2)	85 (2.4)	544 (3.5)	93 (2.0)
Finland	545 (2.3)	68 (1.5)	542 (2.5)	66 (1.5)	549 (2.9)	71 (2.4)
Georgia	450 (3.7)	90 (2.6)	454 (3.2)	85 (2.3)	447 (4.9)	94 (3.6)
Germany	528 (2.2)	62 (1.4)	523 (2.7)	61 (1.9)	532 (2.6)	63 (1.6)
Hong Kong SAR	602 (3.4)	66 (3.1)	598 (3.2)	63 (3.0)	604 (3.9)	69 (3.7)
Hungary	515 (3.4)	90 (2.6)	514 (3.6)	87 (3.1)	517 (3.9)	93 (3.1)
Iran, Islamic Rep. of	431 (3.5)	93 (1.9)	431 (5.2)	90 (2.7)	431 (5.4)	95 (2.6)
Ireland	527 (2.6)	78 (1.6)	526 (3.7)	75 (1.7)	529 (3.3)	81 (2.1)
Italy	508 (2.6)	72 (1.9)	503 (3.1)	71 (2.1)	512 (2.9)	73 (2.2)
Japan	585 (1.7)	72 (1.1)	584 (2.0)	70 (1.2)	587 (2.5)	75 (1.7)
Kazakhstan	501 (4.5)	84 (2.6)	498 (4.4)	80 (2.6)	504 (4.8)	87 (3.1)
Korea, Rep. of	605 (1.9)	68 (1.4)	601 (2.1)	66 (1.4)	608 (2.2)	70 (1.7)
Kuwait	342 (3.4)	101 (1.7)	358 (3.6)	96 (1.9)	323 (5.8)	104 (2.4)
Lithuania	534 (2.4)	74 (1.3)	533 (2.6)	72 (1.4)	534 (2.9)	76 (2.1)
Malta	496 (1.3)	78 (0.9)	492 (1.6)	75 (1.3)	499 (2.1)	80 (1.4)
Morocco	335 (4.0)	103 (2.8)	338 (4.6)	101 (2.8)	331 (4.3)	104 (3.3)
Netherlands	540 (1.7)	53 (1.0)	536 (2.1)	53 (1.2)	544 (2.1)	53 (1.1)
New Zealand	486 (2.6)	83 (1.3)	486 (3.3)	81 (1.7)	486 (2.8)	86 (1.7)
Northern Ireland	562 (2.9)	86 (1.8)	562 (3.3)	83 (1.9)	563 (3.6)	88 (2.8)
Norway	495 (2.8)	68 (1.9)	492 (2.8)	66 (2.4)	499 (3.5)	71 (2.3)
Oman	385 (2.9)	104 (1.2)	398 (3.2)	97 (1.8)	372 (3.4)	109 (1.8)
Poland	481 (2.2)	73 (1.1)	476 (2.4)	70 (1.5)	486 (2.5)	76 (1.5)
Portugal	532 (3.4)	69 (1.9)	529 (4.1)	67 (2.5)	535 (3.4)	70 (1.9)
Qatar	413 (3.5)	106 (2.2)	420 (4.7)	100 (3.0)	407 (4.2)	110 (3.1)
Romania	482 (5.8)	105 (3.7)	481 (6.7)	106 (4.6)	484 (5.9)	105 (3.6)
Russian Federation	542 (3.7)	74 (1.5)	543 (3.7)	72 (1.8)	542 (4.1)	75 (1.6)
Saudi Arabia	410 (5.3)	100 (4.1)	418 (4.6)	84 (2.6)	402 (10.0)	114 (7.4)
Serbia	516 (3.0)	89 (1.9)	513 (3.8)	87 (2.8)	519 (3.5)	91 (2.2)
Singapore	606 (3.2)	78 (1.7)	608 (3.6)	75 (1.8)	604 (3.5)	81 (2.0)
Slovak Republic	507 (3.8)	80 (2.6)	503 (4.0)	79 (3.0)	511 (3.9)	80 (2.6)
Slovenia	513 (2.2)	69 (1.4)	508 (2.2)	67 (2.0)	518 (3.1)	70 (1.7)
Spain	482 (2.9)	70 (1.5)	477 (3.1)	68 (1.7)	488 (3.4)	72 (1.8)
Sweden	504 (2.0)	67 (1.3)	501 (2.5)	66 (1.8)	506 (2.4)	67 (1.5)
Thailand	458 (4.8)	80 (2.8)	465 (4.8)	74 (3.1)	451 (5.6)	85 (3.5)
Tunisia	359 (3.9)	95 (1.8)	363 (4.5)	92 (2.2)	356 (4.4)	97 (2.3)
Turkey	469 (4.7)	101 (4.1)	470 (5.2)	99 (4.9)	469 (4.8)	102 (4.2)
United Arab Emirates	434 (2.0)	99 (1.2)	438 (2.8)	91 (1.4)	430 (3.5)	106 (1.8)
United States	541 (1.8)	76 (1.1)	536 (2.1)	73 (1.3)	545 (1.9)	77 (1.3)
Yemen	248 (6.0)	110 (2.6)	255 (7.0)	108 (3.5)	243 (7.0)	111 (3.1)

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Appendix G.3: Standard Deviations of Mathematics Achievement (Continued)

TIMSS 2011 Mathematics 4th Grade

Country	Overall		Girls		Boys	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Sixth Grade Participants						
Botswana	419 (3.7)	89 (2.0)	428 (4.0)	86 (2.2)	410 (4.2)	92 (2.2)
Honduras	396 (5.5)	84 (3.1)	390 (5.9)	82 (3.7)	403 (5.8)	84 (3.6)
Yemen	348 (5.7)	97 (2.4)	354 (7.5)	95 (3.9)	345 (6.4)	98 (2.5)
Benchmarking Participants						
Alberta, Canada	507 (2.5)	65 (1.5)	502 (3.1)	64 (2.0)	511 (2.7)	65 (1.5)
Ontario, Canada	518 (3.1)	73 (1.5)	515 (3.3)	70 (1.4)	521 (3.4)	76 (2.0)
Quebec, Canada	533 (2.4)	60 (1.0)	527 (2.8)	59 (1.3)	538 (2.7)	61 (1.4)
Abu Dhabi, UAE	417 (4.6)	97 (2.2)	425 (5.0)	87 (2.5)	409 (6.7)	105 (2.8)
Dubai, UAE	468 (1.6)	101 (1.6)	466 (3.5)	95 (2.0)	470 (3.9)	105 (2.1)
Florida, US	545 (2.9)	74 (1.4)	542 (2.8)	73 (1.6)	549 (3.9)	76 (2.0)
North Carolina, US	554 (4.2)	72 (2.0)	548 (4.0)	71 (2.2)	560 (4.9)	72 (2.5)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Appendix G.4: Standard Deviations of Mathematics Achievement

Country	Overall		Girls		Boys	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Armenia	467 (2.7)	91 (1.7)	472 (3.1)	87 (1.8)	462 (3.2)	94 (2.2)
Australia	505 (5.1)	85 (3.4)	500 (4.7)	83 (3.6)	509 (7.3)	88 (4.8)
Bahrain	409 (2.0)	100 (1.7)	431 (2.5)	87 (1.9)	388 (3.1)	106 (2.3)
Chile	416 (2.6)	80 (1.9)	409 (3.2)	80 (2.4)	424 (3.0)	79 (2.0)
Chinese Taipei	609 (3.2)	106 (2.0)	613 (3.7)	100 (2.7)	606 (3.8)	111 (2.1)
England	507 (5.5)	85 (3.4)	508 (5.7)	82 (3.3)	505 (6.6)	88 (4.0)
Finland	514 (2.5)	65 (1.2)	516 (2.7)	64 (1.5)	512 (2.7)	66 (1.5)
Georgia	431 (3.8)	106 (2.1)	430 (4.1)	101 (2.2)	432 (4.4)	110 (2.6)
Ghana	331 (4.3)	86 (2.1)	318 (4.8)	85 (2.4)	342 (4.3)	85 (2.2)
Hong Kong SAR	586 (3.8)	84 (3.8)	588 (5.0)	81 (4.1)	583 (4.3)	88 (4.1)
Hungary	505 (3.5)	90 (2.2)	502 (3.9)	89 (3.0)	508 (3.9)	90 (2.7)
Indonesia	386 (4.3)	84 (2.4)	392 (4.9)	83 (2.4)	379 (4.5)	85 (3.1)
Iran, Islamic Rep. of	415 (4.3)	95 (2.4)	411 (5.9)	92 (3.3)	418 (5.9)	97 (3.6)
Israel	516 (4.1)	98 (2.4)	520 (3.9)	91 (2.7)	512 (5.2)	105 (2.8)
Italy	498 (2.4)	73 (1.8)	493 (2.9)	72 (2.3)	504 (2.8)	74 (2.2)
Japan	570 (2.6)	85 (1.5)	566 (3.1)	80 (2.0)	574 (3.5)	89 (1.8)
Jordan	406 (3.7)	99 (1.9)	420 (4.3)	88 (2.1)	392 (5.9)	107 (2.5)
Kazakhstan	487 (4.0)	80 (1.9)	486 (4.1)	78 (1.9)	488 (4.5)	82 (2.4)
Korea, Rep. of	613 (2.9)	90 (1.5)	610 (3.5)	88 (1.7)	616 (3.1)	92 (1.9)
Lebanon	449 (3.7)	75 (1.6)	444 (4.2)	73 (1.9)	456 (4.7)	77 (2.1)
Lithuania	502 (2.5)	79 (1.4)	507 (2.6)	76 (1.7)	498 (3.2)	81 (1.9)
Macedonia, Rep. of	426 (5.2)	109 (2.7)	430 (5.8)	109 (2.9)	423 (5.6)	108 (3.2)
Malaysia	440 (5.4)	92 (2.7)	449 (5.2)	86 (2.4)	430 (6.2)	97 (3.3)
Morocco	371 (2.0)	86 (1.0)	371 (2.3)	87 (1.3)	371 (2.7)	84 (1.2)
New Zealand	488 (5.5)	85 (2.1)	478 (5.5)	82 (2.4)	496 (6.2)	87 (2.1)
Norway	475 (2.4)	65 (1.3)	476 (2.9)	64 (1.5)	473 (2.9)	65 (1.7)
Oman	366 (2.8)	108 (1.6)	397 (3.1)	94 (1.5)	334 (3.8)	113 (1.7)
Palestinian Nat'l Auth.	404 (3.5)	100 (2.0)	415 (4.2)	94 (2.2)	392 (5.6)	106 (3.3)
Qatar	410 (3.1)	110 (2.1)	415 (5.8)	107 (2.8)	404 (5.5)	113 (2.5)
Romania	458 (4.0)	102 (2.3)	464 (4.6)	103 (2.3)	453 (4.2)	101 (2.7)
Russian Federation	539 (3.6)	81 (1.7)	539 (3.8)	79 (1.6)	539 (3.9)	83 (2.4)
Saudi Arabia	394 (4.6)	93 (2.5)	401 (4.1)	83 (2.0)	387 (8.0)	102 (3.8)
Singapore	611 (3.8)	84 (2.4)	615 (3.7)	78 (2.3)	607 (4.5)	90 (2.9)
Slovenia	505 (2.2)	70 (1.2)	502 (2.4)	70 (1.5)	507 (2.8)	71 (1.4)
Sweden	484 (1.9)	68 (1.0)	486 (2.1)	67 (1.1)	482 (2.4)	68 (1.4)
Syrian Arab Republic	380 (4.5)	97 (2.2)	375 (5.3)	96 (3.0)	385 (5.3)	98 (2.4)
Thailand	427 (4.3)	86 (2.9)	435 (4.2)	81 (2.9)	417 (5.3)	90 (3.2)
Tunisia	425 (2.8)	75 (1.8)	417 (3.1)	75 (1.9)	433 (3.1)	75 (2.1)
Turkey	452 (3.9)	113 (3.1)	457 (3.8)	112 (3.3)	448 (4.7)	114 (3.4)
Ukraine	479 (3.9)	90 (2.1)	478 (4.0)	85 (2.5)	481 (4.9)	95 (2.8)
United Arab Emirates	456 (2.1)	88 (1.2)	464 (2.7)	80 (1.3)	447 (3.1)	95 (1.8)
United States	509 (2.6)	77 (1.6)	508 (2.9)	76 (1.9)	511 (2.8)	78 (1.6)

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Appendix G.4: Standard Deviations of Mathematics Achievement (Continued)

TIMSS 2011 Mathematics 8th Grade

Country	Overall		Girls		Boys	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Ninth Grade Participants						
Botswana	397 (2.5)	78 (1.7)	403 (2.9)	75 (1.7)	390 (3.0)	79 (2.1)
Honduras	338 (3.7)	77 (2.5)	328 (4.1)	76 (2.8)	351 (4.1)	76 (2.5)
South Africa	352 (2.5)	86 (1.9)	354 (3.0)	83 (2.5)	350 (3.4)	89 (2.4)
Benchmarking Participants						
Alberta, Canada	505 (2.6)	63 (1.3)	504 (3.3)	63 (1.4)	506 (2.7)	64 (1.7)
Ontario, Canada	512 (2.5)	71 (1.5)	512 (2.7)	69 (1.6)	512 (3.1)	72 (2.0)
Quebec, Canada	532 (2.3)	62 (1.5)	531 (2.9)	61 (1.8)	532 (2.5)	62 (1.7)
Abu Dhabi, UAE	449 (3.7)	87 (2.1)	450 (3.9)	78 (2.3)	448 (5.7)	94 (2.9)
Dubai, UAE	478 (2.1)	93 (1.9)	486 (4.3)	84 (2.4)	470 (5.4)	100 (2.6)
Alabama, US	466 (5.9)	79 (3.1)	467 (6.3)	78 (3.5)	465 (6.2)	80 (3.9)
California, US	493 (4.9)	81 (2.8)	491 (5.6)	79 (3.1)	494 (5.0)	82 (3.3)
Colorado, US	518 (4.9)	76 (2.2)	516 (5.4)	75 (3.1)	520 (5.0)	77 (2.0)
Connecticut, US	518 (4.8)	84 (2.9)	520 (5.2)	81 (3.2)	516 (5.4)	87 (3.3)
Florida, US	513 (6.4)	76 (3.1)	509 (6.6)	72 (3.0)	517 (7.3)	80 (3.7)
Indiana, US	522 (5.1)	71 (1.8)	518 (5.1)	70 (2.2)	526 (5.9)	71 (2.3)
Massachusetts, US	561 (5.3)	73 (2.7)	558 (6.0)	73 (3.3)	563 (5.5)	73 (3.6)
Minnesota, US	545 (4.6)	72 (2.8)	545 (4.9)	70 (3.0)	545 (5.1)	74 (3.1)
North Carolina, US	537 (6.8)	80 (3.9)	535 (6.2)	78 (4.0)	539 (8.3)	83 (5.1)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Appendix H

Organizations and Individuals Responsible for TIMSS 2011

Introduction

TIMSS 2011 was a collaborative effort involving hundreds of individuals around the world. This appendix acknowledges the individuals and organizations for their contributions. Given that work on TIMSS 2011 has spanned approximately four years and has involved so many people and organizations, this list may not include all who contributed. Any omission is inadvertent. TIMSS 2011 also acknowledges the students, parents, teachers, and school principals who contributed their time and effort to the study. This report would not be possible without them.

Management and Coordination

TIMSS is a major undertaking of IEA, and together with the Progress in International Reading Literacy Study (PIRLS) comprises the core of IEA's regular cycles of studies. The TIMSS assessment at the fourth grade complements PIRLS, which regularly assesses reading achievement at the fourth grade.

The TIMSS & PIRLS International Study Center at Boston College has responsibility for the overall direction and management of the TIMSS and PIRLS projects. Headed by Executive Directors Drs. Ina V.S. Mullis and Michael O. Martin, the study center is located in the Lynch School of Education. In carrying out the project, the TIMSS & PIRLS International Study Center worked closely with the IEA Secretariat in Amsterdam, which managed country participation, was responsible for verification of all translations produced by the participating countries, and coordinated the school visits by International Quality Control Monitors. The IEA Data Processing and Research Center in Hamburg was responsible for processing and verifying the data submitted by the participants; Statistics Canada in Ottawa was responsible for school and student sampling activities; and Educational Testing Service in Princeton, New Jersey consulted on psychometric methodology, provided software for scaling the achievement data, and replicated the achievement scaling for quality assurance.

The Project Management Team, comprising the study directors and representatives from the TIMSS & PIRLS International Study Center, IEA Secretariat and IEA Data Processing and Research Center, Statistics Canada, and ETS met twice a year throughout the study to discuss the study's progress, procedures, and schedule. In addition, the study directors met with members of IEA's Technical Executive Group twice yearly to review technical issues.

To work with the international team and coordinate within-country activities, each participating country designates an individual to be the TIMSS

National Research Coordinator (NRC). The NRCs have the challenging task of implementing TIMSS in their countries in accordance with the TIMSS guidelines and procedures. In addition, the NRCs provide feedback and contributions throughout the development of the TIMSS assessment. The quality of the TIMSS assessment and data depends on the work of the NRCs and their colleagues in carrying out the complex sampling, data collection, and scoring tasks involved. Continuing the tradition of exemplary work established in previous cycles of TIMSS, the TIMSS 2011 NRCs performed their many tasks with dedication, competence, energy, and goodwill, and have been commended by the IEA Secretariat, the TIMSS & PIRLS International Study Center, the IEA Data Processing and Research Center, and Statistics Canada for their commitment to the project and the high quality of their work.

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